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TEACHERS COLLEGE RECORD

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THE ELEMENTS OF PRACTICAL ARTS FOR GENERAL EDUCATION*

By MAURICE A. BIGELOW

Director of School of Practical Arts, Teachers College

Practical arts have appeared in our educational system in response to a widespread demand for special instruction that is directly applicable to the practical and vocational problems of everyday life. It is now generally accepted that there is need of such special or technical training in the education of young people who must be prepared for facing the serious problems of vocational life. In short, practical arts as special or technical education require no defence.

Now, while recognizing the vast significance of practical arts in technical education, we have largely lost sight of the possible contribution of these subjects as a fundamental part of the general education of all young people. This, I believe, is the greatest function of the practical arts in our public educational system, and almost their only reason for existence in elementary education. It is, therefore, the purpose of this paper to point out that the practical arts in their more elementary and general aspects deserve a prominent place in the cultural education of all young people without regard to the need of technical training, which is commonly supposed to be the sole reason for practical arts.

*Extract of an address delivered before the Louisiana State Teachers' Association.

A brief review of the meaning of the term " practical arts " may avoid misunderstanding. Most people who are unfamiliar with the departmental organization of the School of Practical Arts of Teachers College understand practical arts as including only industrial and household arts, both of which have a very practical and vocational relation to daily life. But in Teachers College our organization of practical arts grew out of our very liberal conception of technical education, and so to us " practical arts " have come to include all the educational subjects that are based on a technique or special method of doing things. Hence, in this wide sense, practical arts—which would have been better understood if christened " technical arts "—include fine arts, household arts, industrial arts (both agricultural and mechanical), music, nursing, applied hygiene, and physical education. These may or may not be " practical " or " applied." For example, drawing may be " practical " if applied to house decoration or machine design, but if not applied, it is no more practical (in the usual material sense) than history, literature, or pure science.

I realize that some misunderstanding has arisen from the common use of the word " practical." It seems to me that it is a mistake to understand technical arts as practical or useful only because they commonly have a close relation to the physical or material affairs of everyday life, or because they may be used vocationally as a means of getting a living. I prefer rather to take Huxley's broader view of " practical " and regard knowledge of every kind as useful in proportion as it tends to affect our daily lives. Looking at practical arts from this standpoint, I am forced to regard an understanding of the elements of the technical arts as an essential part of the " practical " education of men and women, and with or without regard to possible physical or vocational use of the technical knowledge.

Practical arts education should be regarded as closely identified with vocational education only when technical efficiency is emphasized. Those who look at the practical arts with the narrowest vision see its values merely in terms of possible vocational application. This, I believe, is an unfortunately narrow outlook. The elements of practical arts may be made

very important as a phase of general education that is not directed towards vocational ends. Perhaps I can make this point clearer by some illustrations: Music and fine arts deserve to be part of general education because they may be of great significance, or "practical" in the larger sense, to many who do not apply them vocationally. Many of the elementary ideas of household arts, such as the economics of food supply, the principles of cookery, the main facts of nutrition, home sanitation, and the principles of house decoration, should be part of the practical education of all boys; but certainly few boys will find their vocations in the field of household arts. Similarly, certain elementary knowledge of industrial arts (including elementary agriculture) should be taught to girls without reference to vocational application. These are illustrations of how the elements of practical arts may be fitted into our daily lives in numerous useful, but non-vocational, ways.

The above suggestions as to the desirability of similar elementary training in the practical arts for both sexes leads me to the problem of differentiation for boys and girls. In these days we hear much discussion of sex-differentiated education, and it usually refers to the field of practical arts. We do not hear any serious educators advocating one kind or selection of literature or history or mathematics for girls and another for boys; but we hear many proclaiming that household arts is the proper study for girls, and that simultaneously the boys should study mechanical or agricultural arts. Some well-known educators have gone so far as to declare that co-education is a mistake in so far as it means similar education for the two sexes; and by "similar education" they mean the old-line education without practical arts.

Now, we must admit that the advanced technical aspects of household, industrial, mechanical, or agricultural arts are not of equal interest to both sexes; and, hence, practical arts education in its specialized forms must be dissimilar. But note that this refers to the advanced technical or special work and not to the elementary study of the leading facts and principles of practical arts. With regard to these, I insist that there should be no differentiation on sex lines, and I feel sure that we have already gone too far in drawing the line between the

elementary practical arts for the two sexes. Let me illustrate: In many schools of the United States we find household arts specified for girls in elementary grades and in the early years of the high school, while parallel work in agriculture or industrial arts is assigned to the boys. The result is that some of the most useful applied science is sex-limited. Elementary lessons in household arts contain important facts and ideas concerning food economics, principles of nutrition, applied chemistry and physics, bacteriology, sanitation, first principles of cookery—all of which should be a part of the practical, but not technical, education of both boys and girls. It is not fair to the boys that such a train of useful scientific applications should be reserved for the girls under a system of sex-limited instruction in household arts. On the other hand, the agricultural or industrial arts assigned to the boys deal, in the elementary instruction, with many facts that should not be monopolized knowledge of the male sex. Industrial arts deal with the world's work and modern women should have cultural, if not technical, knowledge of the great industrial relations and problems. Therefore, I advocate that girls should have elementary shopwork instruction, especially since so much of it applies to the home and at the same time will help women to understand industrial life; and they should have at least one year of elementary agriculture in every school which offers it for the boys.

These illustrations will make clear my meaning when I declare that we have already made some serious mistakes in differentiating certain aspects of elementary practical arts along sex lines. This extreme differentiation seems to have had its origin in the names and definitions given to household and industrial arts. Some committee declared years ago that housework is not an industry and that industrial arts are primarily of interest to males. Having thus set off household arts exclusively for women and industrial arts largely for men, the courses of study in our schools have been developed without regard to the fact that in the elementary facts and ideas of each of these practical arts there is much of value and interest to both sexes.

Now, as the solution of this problem, which I believe is the most important one which now affects practical arts for public

schools, especially in years below the second of high school: Evidently we can not solve it by advising household arts for boys or industrial shopwork for girls. Boys will not elect courses called household arts, or domestic science, or home economics. A few girls will elect, under favorable conditions, agriculture or mechanical arts. The result is sex-differentiated practical arts. It cannot be otherwise under the names "household" and "industrial." I have come to believe that we must offer the elementary practical arts of interest to both sexes under new names, and not apply such names as industrial arts, household arts, or agriculture, until advanced technical differentiation between the two sexes is natural and useful. In my opinion, a very limited amount of such specialized study is needed in elementary schools.

There are two possible arrangements looking towards this end: (1) Teach the elements of practical arts equally to children of both sexes in elementary schools; and call such study "practical arts," not household or industrial arts. (2) Involve the elements of practical arts in the other subjects which are fundamentals for practical arts. This means fine arts and the natural sciences (including nature-study and elementary science).

I prefer the second suggestion for the beginning because it seems to me most natural and economical. However, the teacher must work from the practical arts point of view, and so it little matters whether the desirable studies be presented as elementary practical arts or as applications of elementary sciences and fine arts.

By teaching the elements of practical arts in connection with the fundamental subjects, I mean that beginning with the earliest nature-study and art work the practical bearings should be developed. For example, the art lessons of the elementary schools might be arranged so as to give both boys and girls the essential knowledge of the household arts applications in home furnishings and decoration and costume design. Of course, I do not mean technical training in these lines; but, for that matter, no very important technical training could be taught in elementary schools even if these applications of art were limited to girls in a class in "domestic art." In a similar manner, all the important facts of hygiene, nutrition, food

economics, home sanitation, and even the principles of cookery, can be made interesting to both boys and girls of years equivalent to junior high school, if presented as integral parts of a good course, or courses, in nature-study and introduction to science or elementary science, often misnamed " general science." This also gives numerous opportunities for the mechanical side of industrial arts. In like manner, the elements of agriculture (not the technique) should be taught so as to reach both boys and girls, in nature-study and in applied biology. These are some ways of making elementary practical arts essentially the same for both sexes.

Summarizing the above points, I conclude that sex-differentiated study of elementary practical arts should be avoided (1) because it is highly desirable that education in general should tend to make men and women sympathetically interested in the same problems of life; (2) because it is financially desirable that the values of elementary practical arts be obtained as far as possible without the added expenses inevitably connected with new and special classes; and (3) because the present differentiation between the sexes deprives each of knowledge which is important for the practical purposes of everyday life. For these three reasons, I urge that the elementary facts and principles of practical arts should be taught so as to make both sexes understand (but not be experts) in the same practical problems of life. Co-education will deserve to be a failure if it does not give young men and women similar outlooks on life in all its aspects—practical as well as intellectual. Thus viewing the possibility of cultural, rather than vocational or technical, bearings of the practical arts, I am unable to believe in sex-differentiated elementary studies in these lines.

In closing, let me emphasize the thought already expressed that, while the technical aspects of the practical arts are beyond question the foundations of special or vocational training, the leading facts or ideas, that is, the elements of the practical arts, deserve a prominent place in education for general culture, because they have the larger " practical " bearing on our daily lives.

ALUMNI TRUSTEE'S REPORT

Present Opportunities and Needs of Teachers College in Practical Work*

By LIDA LEE TALL

Supervisor of Grammar Grades, Baltimore County, Maryland

Just what is meant by "practical work," in such an institution as Teachers College? This question must be answered in order to define the problem. The term is used with reference to strictly professional training, not in connection with ordinary laboratory work such as is necessary in physical and biological sciences, nor with written exercises such as are common in the study of most academic subjects and in courses in the theoretical aspects of education. Probably nothing will be more helpful in approaching this problem than a glance at the conditions in professions other than education.

It appears at once that in all professional training at the present time a strong effort is made to reduce to a minimum the comparative inefficiency during the period through which every beginner, however well he has mastered the theory of his work, must pass in "gaining experience." Although the professions rest upon sciences, their practice requires skill in *doing*, and every one who has practiced a profession realizes that the sense of mastery comes only with practice, and the capacity for truly constructive work only with experience. This fact has come to be more and more definitely recognized in all forms of professional training, and increasing efforts are made to meet the problem and to deal with it more efficiently. Observation of actual professional activities plays an important part, but there seems to be a growing tendency to provide for

*In preparation for this task I had the pleasure and advantage of conferring with many of the officers of administration and instruction of Teachers College, many of whom had constructive ideas and enthusiastic belief in the possibilities of this phase of graduate work; their suggestions have contributed much to my report.

the learner actual practice of kinds that will approximate as experience the work that must be done later in the given profession.

For example, the student of engineering does not stop with the theoretical study of the action of steam in the cylinder of an engine; he watches the practical work of making indicator cards to show what an engine is doing, then he himself makes and interprets such cards. He takes charge for a time of an engine, a dynamo, or some other machine; he tests his calculations with real materials; he visits industrial and mechanical plants for observation or brief periods of experience. Training for the practice of medicine is perhaps even more interesting for our purpose. Every medical school must have as a matter of course its hospital and dispensaries in which the actual practice of medicine and surgery are carried on. Extended observations and clinical work are required of all students, opportunity is provided for the "picking up" of endless practical points that could never be taught in lectures: there is service in the dispensaries and about the hospital wards, and so on. Is there any reason to regard education as on an essentially different basis from other professions in this matter of training? I think not.

Gradually such institutions as Teachers College, with some outside aid from special foundations and individuals, are building up a body of truly scientific knowledge upon which a real profession of education may be based. Natural gifts, of course, play a prime part in success in this field as in any other, but we are coming to recognize that teachers and superintendents are not "born" instead of being "made," except in the same sense that is true of lawyers and physicians. Scientific investigation to widen the field of knowledge or to make use of knowledge already acquired in various sciences that underlie education, is necessary in teaching; even more essential than in the older and better established professions. In preparation for the practice of the educator, a body of scientific knowledge must be mastered, and skill must be acquired in applying it to the activities peculiar to the profession. It is, then, vital that we have institutions in which adequate provision is made both for *research* and for the *training of leaders* in the *practice*

of the profession. This is just the place which Teachers College has filled, and which it must continue to fill and to fill much better. It was a radical step to put the college on a graduate basis to prepare for a profession the vast majority of whose members are still trained in normal schools, high schools, or fail to get any professional training at all. Such a step entails new responsibilities and offers new opportunities for leadership.

In the field of education, research is closely related to practice for positions of leadership, and the two cannot be considered wholly apart, even if it were desirable to do so. The scientific spirit demands the constant testing of theories and conclusions, and such testing provides opportunities for practice in just the kind of work that must be done later in the regular activities of the profession. This spirit is admirably expressed by Mr. Abraham Flexner in his able and influential report on medical education: "Modern medicine wants not dogma but facts. 'Science believes slowly. In the absence of crucial demonstration its mien is humble, its hold is light. One should not teach dogmas; on the contrary, every utterance must be put to proof. One should not train disciples, but form observers. One must teach and work in the spirit of natural science.'" Change the word "medicine" to "education" in this quotation and the statement would be equally sound.

Teachers College now offers fifty-six different professional diplomas. In every one of these the college definitely certifies that the holder has demonstrated in practice that he can *do* the work for which the diploma is granted, be it that of superintendent of schools, teacher of history, dean of women, or principal of a high school. Is the College, under existing conditions, able to make the assertion as unreservedly and with as much fullness of meaning as is worthy of such an institution?

In each of these cases we need a careful analysis of just what one has to *do* in practicing that phase of the profession. There is the same problem of specialization here as in medicine and surgery. To be specific, consider the case of the superintendent of schools. What are some of the qualifications that he should have? First of all, executive ability in the general

sense of being able to do things. He must deal with public finance and in particular with the school budget; he must be able to judge teachers fairly, to measure the results obtained in the schools, to direct the making of courses of study and the selection of text-books. It is important that he know how to study the conditions and needs of a community in general, and that he should be successful in his relations with his subordinates, the board of education, and the members of his community. It is obvious that before the College places its seal of approval upon a candidate for such a position, it should know definitely a good deal about his practical ability to do as well as about the knowledge he possesses. That real practice work in at least some of the activities is entirely possible, is demonstrated by work that students specializing in educational administration in the College are actually doing now. Groups of students from Teachers College have worked out partial "surveys" in the outlying New Jersey and Connecticut districts, testing pupils with the Hillegas scale for English composition, with the Courtis arithmetic test, with the Thorndike handwriting scale, with the Buckingham and Ayres spelling scales, with the Harvard-Newton English composition tests, with the Binet-Simon tests, etc. Score cards for scoring classes of school buildings have been worked out, teachers have been rated, and various other activities or conditions scientifically appraised. Statistics are being developed and a body of scientific knowledge gradually accumulated for the bettering of school administration. But much more must be done before every candidate for the position of superintendent or principal can be confidently certified by the college as fully qualified for the practice of his profession.

Much of the practice work desirable for those who wish to be principals and supervisors is similar to or identical with that just suggested. Arrangements might be made for those training as principals to spend some time in the office and on the rounds with a successful principal, observing the kind of problems that arise and how they are met, perhaps actually performing some of the routine duties. Visiting with superintendents and supervisors could doubtless be arranged. A great amount of detail knowledge can be "picked up" in the

office of a principal or superintendent that cannot be acquired in any other way. Something may also be learned of those problems in personality and personal relations which cannot be formulated theoretically so as to be of much use, which can be learned, if at all, only through the suggestion of actual observation and experience. There are endless possibilities for measuring results and estimating the quality of teachers. Some work in these fields might be made of enough value to nearby school systems to induce school boards to pay the actual expenses of the students engaging in it. In the past three years, a few students of this department have been paid to assist the director of several important school surveys. Of course it goes without saying that the character and amount of this practical work would differ for those students who come with successful experience behind them.

A partial survey of the practical situations in which many of the two thousand students of Teachers College are now working might prove interesting. Some of the facilities available for the work are found in the Horace Mann School; the Speyer Junior High School; New York City schools; smaller adjacent city school systems, particularly Leonia, Cliffside, Grantwood, and Newark, all in New Jersey; private schools, among which are the Ethical Culture School and Miss Bentley's Kindergarten; several New York hospital schools; several settlement houses; the Amy Schüssler Apartment; Whittier Hall; some department stores and factories of New York City; and typical rural fields within a radius of fifty miles.

Suggestions as to what is being done in the field of administration have already been given. These students, in the main, are working actively in the smaller adjacent city school systems, or by correspondence with inaccessible situations. The cost of this work to the student has ranged from nothing to $600. The cost to the College depends upon how much clerical help the adviser has at his command to keep track of the investigations. One student, a superintendent, after he had made a study of school finances and expenditures, using his own system as the laboratory, said: "This is the first time I've ever been able to get the millionaire members of my board interested in my work."

For students specializing in elementary education the Horace Mann School affords facilities with limited privileges. Several of the professors of Teachers College and their students are carrying on interesting experiments there in special subjects: in kindergarten, in reading, in history, in spelling, in arithmetic. These experiments are open to the observation of students, the teachers of the school acting as assistants to the members of the college staff.

This year ninety students, registered in elementary supervision, are working out constructive problems in the Leonia and Cliffside schools. The superintendent of the Leonia schools is a member of Teachers College staff, and the work in consequence is heartily coöperative. Students assist the teachers by carrying on experiments in some special phase of subject-matter for a period extending over five weeks; they take charge of classes when the regular teacher wishes to visit; they work out some of the efficiency tests; in fact, they do some of the things they will be called upon to do later in a supervisory capacity.

For elementary education the New York City schools offer a field of rather limited value. The size of the classes and of the buildings are not typical of conditions in the schools throughout the country, nor are the elaborate organization and administrative machinery, which, moreover, do not lend themselves flexibly to the needs of the college departments. On the other hand, the huge system presents a wide variety of special conditions and problems that are valuable for observation and study at least. Dr. Lida B. Earhart, formerly on the staff of Teachers College, now one of the New York City principals, has made suggestions that are well worth considering:

> . . . "Presupposing that the college students who wish to do this work in the city schools have ability, there are many problems upon which they might profitably work in the actual field. Here are some that confront me in my own school:—The kind and amount of work to be done in lesson-plans by a teacher who has all the subjects of her class to teach; how to evaluate tests so as to make them yield the greatest results to teachers and pupils; how to utilize tests as a means of supervision of instruction; how to gather together the local idiosyncrasies of speech so as to base the course of study in language upon them sufficiently to overcome such defects; the conditions under which the children do their homework, and what can be done to remedy them; improving methods of home study; providing suitable entertainment in the homes so that the children will find their amusement there rather than in the streets; how to combine all social and charitable agencies so as to have them work towards the common purpose of taking care of the children whose sole recreation seems to be connected with the street."

Students in secondary as well as in elementary education are coöperatively received by many school systems within a radius of fifty miles of New York. Indeed, there are many more opportunities for this coöperative work in the secondary field than the College is able to take advantage of at present. An interesting report by Professor Romiett Stevens who, with Superintendent Garver of the Leonia schools, is in charge of practice teaching and experimental work for secondary education students, states what was done in the Leonia and Cliffside schools last year:—

"Reconstruction of all office cards and records (amplified to include study of card system in use in 100 cities), special recommendations made for Leonia—recommendations accepted. Card for permanent record work of teacher in training is appended.

"Complete course of study in physical education for boys, adapted to needs of Leonia where there is not a full time instructor.

"Scheme for out-door athletics for boys. Two men from Dr. Wood's department are meeting with the Leonia boys every Saturday morning during third unit to direct the work.

"Course of study in literature for two classes of students: college preparatory and commercial.

"Studies in supervision: opportunities given to graduate students for supervision and criticism of practice teachers; opportunities given to foreign students to supervise.

"Studies in the application of mathematics to practical things.

"Studies in moral instruction, being tried out now in Leonia assembly.

"Study of the manual training situation—the needs of the community, and the nature of the work."

For the secondary education students probably the junior high school movement being put into operation in the Speyer School will offer as interesting a laboratory for practical work as the College has ever afforded. The Speyer School building has been turned over to New York City. There, in coöperation with the city, a junior high school experiment will be started in February, with Mr. Jameson of Public School No. 43 as principal and with Professor Briggs of the College as educational adviser. The possibility for experimentation by the specialists in Latin, history, mathematics, geography, and modern languages can be seen at once. The school is in close proximity to the College and supervision of the experimentation is thereby facilitated.

There is some substitute work done by the graduate students in the New York City high schools, but this, of course, is a field that will vary from year to year, dependent upon the

supply of substitutes on its own waiting list which New York City has available. This is not a particularly productive field for secondary education experimentation.

One special difficulty confronts the secondary education staff. Unfortunately, the majority of teachers in the secondary field have not yet acquired professional consciousness and a desire to investigate professional problems. Instead of testing their results they consider that their continuous preparation consists in doing more and more academic work. This situation limits the number of graduate students who register for any experimental or scientific work in secondary education —a condition which of course will be remedied in time.

For the student in the School of Practical Arts, the facilities are abundant. The equipment in household and industrial arts in the Speyer School is being used by about thirty city classes for manual training, cookery, and sewing, under the direction of graduate students of the School of Practical Arts. The Speyer School apartments will be utilized this winter by the Hebrew Orphan Asylum, which will send, under qualified directors, groups of six to eight girls, for periods of about six weeks each, for opportunity in real homemaking. It will be the first time these orphan girls have ever had experience in practical homemaking subject to their own management instead of that of the orphanage. Graduate students of Teachers College will keep in close touch with the experiment.

The Washington Irving and the Julia Richman High Schools in New York City give opportunity for the college students to practice in household arts with graduate students in the capacity of supervisors. One graduate is now studying the problems of vocational guidance in these schools. Hartley House, a settlement not quite typical of regular class-room work, presents opportunities for forty classes under the care of students of Teachers College. It thus appears that the special problems are worked out by graduates in the supervision of the work of other students in practice teaching. Other studies that have been reported in this field include:—welfare work with factory girls, including noon lectures in factories; the immigrant problem in relation to the teaching of home work; nutrition for tenement house women; the domestic ser-

vice problem; household arts in the foreign mission field; household arts in rural extension, including field work in Long Island, Westchester County (New York), and in Hampden County (Mass.)

For future growth a large vision has come to members of the household arts staff. They wish to work out a field division of household arts education that will render expert assistance to towns, villages, and cities that need advice in organizing departments of household arts, thus providing at the same time valuable public service and wide opportunities for practical work. To do this it will be necessary to have a corps of experienced and expert teachers—much larger than the College now possesses.

In the field of nursing and health some experimenting has been done with the teaching of hygiene, " first-aid," and home-nursing in some of the schools of New York City. A part of the practice work is carried on in connection with the hospital training schools of the city. Here the problem is new, but the needs for the future are being felt. The richest suggestion that has been offered,—one that is filling the minds of all interested in this field—is that there should be a new college dormitory under the control of the social director, but immediately subject to the staff of institutional administration—a house that could be utilized for the testing and training of students to organize and direct work, to handle affairs and people, to accept responsibility. This would provide opportunities not only for those in training to be deans of women, but for all graduate students who are interested in sanitation, nursing and health, for prospective superintendents of hospitals who are interested not only in the welfare of the sick, but also in the administration of an institution concerned with housing accommodations, large buying, etc. Whittier Hall accommodates only 450 students; about 700 come from nearby cities and towns; the other 442 live in rooming houses near the College. A new dormitory, besides helping to solve a housing problem of prime importance, would serve as a practice-house, and remove some of the present difficulties due to lack of facilities for practical work in one great school of the College. It might prove interesting in this connection to give the sug-

gestions of a member of the faculty regarding the practical work for groups of women registering for the diploma of Dean of Women:—(1) In the Horace Mann girls' school two women each year, one for the junior and one for the senior high school, to assist the principal. (2) An adviser, other than the faculty members now serving, for each of the classes in practical arts. (3) An assistant to aid in compiling a good boarding house list. (4) Several women to help in Whittier Hall, as members of a council, each having charge of a group of students or of an entire dormitory floor. The members of the council could meet weekly to discuss not only the students under their care but also the efficiency of the dormitory generally.

In connection with the School of Practical Arts, further courses in vocational-guidance problems will have to be offered, but this work needs no new practical fields, those already mentioned affording ample opportunity.

In the work with defectives, delinquents, and other atypical groups, the New York City schools under Miss Farrell's direction are coöperating in a most profitable way with the members of the College staff in psychology. It will doubtless be necessary in the near future to establish a permanent psychological clinic, preferably in one of the nearby city schools. This project can doubtless be carried out much more easily than many of the others that have been suggested.

For the rural field, situations typical of practically every rural situation in the country are to be found within fifty miles of New York City. Just now Dr. Warren H. Wilson and his advanced students are engaged in making a survey of conditions of rural life in Westchester County. Professor Dodge says: "They are securing valuable first-hand material for us for class discussion, and gaining a good understanding of the people and of rural social betterment through the comparative data they are evaluating."

This long list does not pretend to state all that is being done, nor to suggest all the needs, nor to indicate all the possibilities. No one could talk with the members of the faculty and their associates without becoming inspired by the wonderful possibilities of the College in developing the fields of research and practical work, in making contributions to the science of

education and in training superior men and women for positions of leadership. But such development is a great undertaking, absolutely demanding an adequate and properly organized staff and necessary financial support. Already the College staff is becoming inadequate to accomplish properly all that is to be done. Such work as we have been considering requires careful, elaborate, constructive planning; and continuous, intensive, expert supervision, with ample time for individual conferences. Close coöperation among the various groups of instructors is needed to prevent duplication and waste, and to make each advance the work of the others. The practice work must be so organized as not to involve the wastefulness and inefficiency of serious interference with attendance upon courses of instruction. There must be sufficient clerical help; much more than is now available.

Research work is inseparable from practice work for positions of leadership in a professional school of graduate rank. Members of the staff who are gifted for such work must be allowed abundant time to carry it on, and there must be proper correlation with the practice and theoretical activities of all groups. There should, indeed, be an organized group for statistical and research work, a project that would be the more feasible because the College already possesses a man preëminently qualified to direct such work.

Notwithstanding the facilities the College now commands or may readily obtain, the time will soon come when it will face the acute need of an experimental school of its own—an institution embodying its own ideals, free to develop upon the lines desired, possessing ample equipment, and having an adequate staff of teachers and supervisors chosen for their open-mindedness, their splendid professional ability, their powers of constructive thinking, their proved efficiency, and their faith in the possibilities of education. Principles could be applied and tests extended under direct and complete control from the kindergarten through the high school.

There should be more opportunity for the actual teaching of children by members of the college staff, including those of professional grade. An eminent surgeon teaching in a medical school continues to work in the operating room, not merely to

save life but to advance his science, to improve the technique of his art, and to demonstrate what is possible for the benefit of his students. The idea does not apply to all departments of a professional school of education (nor to one of medicine), but it does apply to several of them most forcibly. Furthermore, such work has the merit of constraining the eminent theorist to keep his feet upon the ground and his principles based upon realities.

It has been impossible to do more in this report than to suggest in somewhat general terms, with typical examples, the possibilities and desirable lines of development. The working out of detailed plans will involve a vast amount of labor, the solution of many difficulties, the utilization of many special points of view and various kinds of expert knowledge. This must be done by the College officers of administration and instruction, with the best advice and assistance they can obtain. But most fundamentally of all, it is a problem for the trustees, because a large question of policy and a serious financial problem are involved. Every project that has been mentioned entails expense. If anything is to be accomplished, if the College is to hold its position of leadership in the field, the trustees must give their encouragement and support; must find the ways and means.

GENERAL SCIENCE IN SECONDARY SCHOOLS

By THOMAS H. BRIGGS

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When doctors disagree, the layman is emboldened, after considering the facts that they present and he observes, to draw his own conclusions. While in many respects ignorant, he is not as likely as they to be restricted by tradition, and if he have a wider perspective he may present conclusions at least suggestive to the protagonists. That the doctors do disagree concerning the case of General Science is obvious enough to anyone who has read educational magazines during the past few years or who has listened to the discussions at educational meetings. Indeed, the nature of these discussions, both written and oral, has often left the impression that the frequently mentioned "scientific attitude of mind" is something to be taught the pupil for use in the laboratory rather than an attainment to govern the consideration by experts of general policies of procedure. It is strange that temper has so often been shown, that advocates of both sides have been so free to declare an opponent "no scientist" merely because he fails to accept standards that are set forth, often with little more than personal or arbitrary opinion for a justification.

The problem seems simple enough to state: what material and method of science shall be presented to the pupils? But immediately on attempting its study one finds difficulties. In the first place, what are the desired ends of the only science that perhaps a majority of the pupils in secondary schools ever have? What determines the data that of necessity are involved? What principles underlie their presentation? In the second place, what is there in common in botany, physical geography, physiology,—the subjects most frequently presented to ninth grade pupils—that makes them seem to their advocates so superior? What is meant by the recurrent phrase

" related knowledge " ? On the other side, what is General Science ? What do its advocates mean by their slogan " project teaching " ? The absence of satisfactorily clear and complete definitions of these and other terms, definitions clarified by illustrations, has been, and is, probably the greatest obstacle to the attainment of an understanding by each side of the other, to say nothing of a solution of the problem. It is hardly scientific to argue any question unless there be agreement as to what the issues are and what the terms involved mean.

As suggested above, one side believes that the matter and method should be logical; the other, to use Dewey's term, that they should be psychological. A result of the first type of selection and organization is that there are vertical divisions of subject matter, that the facts of physiology occupy one field while the facts of botany occupy another, each entirely separate from the other in presentation. From the point of view of the systematic scientist of the old school this is undoubtedly true; stamens and chlorophyl have little or nothing to do with tibia and fibula. But what he apparently has failed to appreciate is that after years of study he is looking on the phenomena of life from one point of view, which is restricted and artificial, while his pupils, fresh from childhood, inevitably look upon them from another, which, although narrow, is wholly natural. To him his point of view may be ideal, but it is likewise certain that it neither is nor can be theirs; moreover, it is not the point of view of the educated adult or of the practical scientist of research or of business. The attempt to force upon children this highly logical organization, beginning with its laws dearly won through years of labor in field and study and continued with data mostly unknown in daily life, by common consent has not been successful with any large proportion of pupils in early adolescence, and besides, it has certainly taken away much of the interest inherent in the age of naive curiosity.

It is obvious to any observer of laboratory work that the academic organization, so carefully developed and presented in text-books and courses of study, is seldom appreciated by pupils; indeed, one is led to wonder how many of the instructors themselves really comprehend it. In visiting more than

two hundred laboratory classes in high schools during the past few years I have repeatedly asked pupils at work what they were doing. With few exceptions the first answer has concerned the superficial operation: "I am trying to make the meter stick balance by adjusting this weight" or "I am making a sketch of a sea urchin." When interrogated further the members of the class have evinced varying degrees of understanding of the purpose of the exercise and in the rarest cases any comprehension of its relation to the organization of the book, to general laws, or to "underlying principles." One cause of their ignorance is quite clear: it is not every teacher of science who can explain just what each particular exercise and experiment is designed to accomplish, just why out of the thousands of physical phenomena it was selected. It hardly seems that the fundamental spirit of science can be inculcated in pupil or in teacher unless facts are related in such a way as to effect a desired end which is always consciously the goal sought.

Another result of this vertical stratification and "logical" organization of subject matter is that facts are valued not as they satisfy any natural demand, but, rather, as they fill in the outlines conceived only by a master scientist informed of the results of all the ages of human investigation. One is reminded of a character in the seventeenth century comedy who declared, "I content myself with the speculative part of swimming; I care not for the practice. I seldom bring anything to use; 'tis not my way. Knowledge is my ultimate end." Well, pure science has its place; but surely what we present to fifteen-year-old children should not be so pure that it is unsullied by any assured use. Pure science has contributed wonderfully to the life of the world—and to the intellectual death of the immature pupil. It was a teacher well trained as a pure scientist who declared, "I think it is perfectly disgusting to teach boys and girls about their own bodies." His logical organization preferred that the little girls should draw on the blackboard a painfully accurate diagram of an earthworm, locating (without explaining their function) the typhlosole, clitellum, annulata, and gizzard, when by actual show of hands one half the class thought they themselves had gizzards while the other half suspected that they had none.

If one is too ignorant of psychology to know what becomes of facts related only to each other in a dimly perceived organization and not at all to anything in life activities or interests, he has only to take a census of what is remembered by his acquaintances who have had introductory science and none afterward. The claim that even if definite facts are lost marvelous powers of the mind are miraculously left puts the claimant at once back with the formalist whom originally he set out to displace. Surely science has better justification than some of its uninformed friends would let us believe.

All of these results seem unreasonable and unjustifiable by any standards that he accepts elsewhere in education. Fortunately it is not the whole story, or even any considerable part of it, among well-trained teachers; but it is shockingly true among their far more numerous colleagues. In almost every progressive school are found scientists who have definitely conceived, specific, and worthy purposes for the major as well as the minor parts of their teaching, purposes which are manifested continually to the pupils with such enthusiasm as to develop a concomitant " emotional prejudice " in their favor; in various types of schools are found teachers who so far as possible draw their illustrations from near at hand and obviously useful phenomena; and both teachers and text-books have recently been tending more and more to present, usually as postscripts, however, applications of principles to common life situations. But in profession at least, all teachers of " special science " retain the vertical stratifications between subjects and within each an organization highly logical so far as the facts alone are concerned. In actual practice, particularly when a real problem as opposed to a laboratory exercise arises, it has been interesting to see how the best teachers forsake their professed principles and seek a solution by what they would term in others " quite unscientific means." That the advanced student almost invariably ignores the artificial stratifications of school text-books is easily seen on examination of almost any list of projects undertaken by scientists who are seriously seeking results for themselves rather than attempting conventionally to instruct youth.

From this situation has sprung " General Science." It is

difficult to define the subject, for two reasons: in the first place, the means of improvement proposed by those who have felt the inadequacy of the special science plan have been various; and, second, those who have outlined courses of study have all apparently felt that it would be fatal to make at once too radical a change, and hence they have adopted compromises. It is natural that pioneering should be ragged and unsatisfactory, and many of the pioneers in general science have been true to nature. The first of the recent text-books in general science were little more than chapters on several sciences bound together; and each of the later ones has been primarily based on physics, or botany, or geography, or chemistry, according to the bent of its author. Beginning thus in diversity and compromise, it is natural that the new subject should be greeted with an abundance of criticism; it is wholesome that it should have been, for both the reactionary and the progressive ought to profit by discussion of the existing situation and the means proposed for improvement. It is unfortunate, however, that the discussion should at various times have been most vigorously promoted by some who apparently have more interest in the commercial than in the educational aspects of the matter.

Before attempting to define this new subject of study, let me state in the order of their importance, as they seem to one interested in general education, the four functions which courses in science should have. First, they should afford culture. All men and women are most of the time consumers rather than producers, to use Snedden's enlightened distinction; hence it is wise that as early as possible with economy everyone should be given an intelligent understanding of the most common phenomena in the environing universe. This intelligent understanding is not necessarily exhaustive; it is such that it satisfies the intellectual demand to know what various common objects are, how they work, what they are for, and how they are caused. Most of this desired information is too incomplete to insure production; but it is a desirable, perhaps a necessary, preparation for the later acquisition of the more detailed and accurate study, it satisfies the very actual social needs, thus making us more comfortable as participating in the knowledge

common to our fellows, and it increases appreciation of the commonest and most striking phenomena in our lives. The possession of such knowledge surely should provide enduring satisfaction and abiding interest in the world of science. Second, courses in science should train pupils to do, with intelligent understanding and economy, such tasks as are most likely to be theirs in life. This is frankly a demand for the emphasis to be placed on specific rather than on general habits. Whatever our belief concerning general habits, we can hardly deny that those most emphasized are not noticeably inculcated in the majority of students, nor can we deny that desirable general habits can be secured only after and by means of desirable specific habits. By making the latter our primary interest, we shall at least have some valuable and practical results from the science instruction, whether " the scientific attitude of the mind " and other such larger ends are attained or not. Third, courses in science should explore both the field of science and the pupil himself. The generally prevalent elective system in secondary and higher education is based on the assumption that the elector knows his own aptitudes, interests, and abilities, and that he understands something of the subjects—their content and their methods—among which he must choose. Such valuable information could certainly be imparted economically and effectively in courses in general science. If the student can be shown during an introductory survey course that science is of assured value to him, the election of other advanced science studies will be more nearly what was generally prophesied when the subjects, less than a generation ago, were given their present emphasis. Fourth and finally, courses in general science should prepare pupils for the higher study of such science as they may afterward elect. It is conceivable that some details valueless at the time in themselves will be justified because they can be taught quickly after an excursion or exercise; but surely such data will be few, primarily because the best insurance for economical learning and retention is use, and secondarily because most of the pupils in the first year of high school, on account of elimination from school or the press of other interests, are not likely ever to elect any other science later in the course.

The definition of general science that follows probably will not satisfy all of those who are actually developing the subject; but if the subject is to justify itself in secondary education it seems reasonable that it have the following characteristics. First of all, it must be based on the truly logical (and at the same time psychological) method of thought expounded by Dewey. The form of logic required in geometries and the usual science text-book is unmistakably convincing, but it is never used by even the matured scholar for any purpose except to explain how he has reached his conclusions. In actually solving a problem, everyone consciously or unconsciously must be aware of a perplexity, which he identifies or defines; then he proposes to himself as possible solutions a number of hypotheses, each of which he tests by actual or imagined experiment and observation until he reaches a satisfactory conclusion.[1] Second, general science must provide for the interest arising from a conscious satisfaction of a personal need. Dewey in "Interest and Effort in Education" has defined this interest as "the identification of the self, through action, with some object or idea because of the necessity of that object or idea for the maintenance of a self-initiated activity." Every real problem or project in science, then, must originate from a perplexity, the solution of which is felt to be necessary for the satisfaction of a personal need. This need may arise in the natural course of experience or it may be presented by the teacher directly or indirectly through excursion, lecture, or reading; what is absolutely necessary is that it be comprehended, approved, and adopted by the pupil as his own. It makes the pupil say, "I want to know," whereas the ordinary method makes him say, "Teacher wants me to know."[2]

As a result of these fundamental characteristics a course in general science can not be planned in its entirety for any class. Ideally a class would consider in turn the series of problems

[1] Dewey: How We Think, Chap. VI.

[2] In the Bulletin of the Illinois Association of Teachers of English, Oct., 1915, Professor E. S. Jones vividly characterizes a former teacher who used the method advocated here. "He started from a particular fact that everyone knew, and ended with a big truth everyone was happy to discover. He had an uncanny faculty of beginning with the thing the student was thinking about or liked to think about, and ending with the thing he ought to think about."

proposed by its members, or, more extreme still, each pupil would, independent of his fellows, attempt the solution for his own personal problems. And there are some, it is said, who seriously propose such extremely differentiated class work. This reduction to confusion, however, is not necessary. Young pupils, like older ones, are not as a rule conscious of what most of their problems are, and as a consequence they adopt with avidity many a one whose relation to themselves they recognize first when it is reported by some classmate or when skillful preparation by the teacher leads them to think that they have discovered it for themselves. With some knowledge of glaciers, for example, resulting from incidental reading, an illustrated lecture, or a museum exhibit a class will find problems enough on an afternoon tramp to a terminal moraine to stimulate them for a month of work. A cage of pets, an experiment in testing seed-corn conducted at the Farmers' Institute, an automobile stalled by the roadside, an epidemic of disease, a hybrid ear of corn brought in as a curiosity, a news item concerning wireless telephony, a fledgling bird calling on a fence rail, a lunch kept hot in a thermos pack, the curve of a baseball, the best location of a tennis court—the stimuli to problems that must be solved to satisfy normal curiosity, to effect skillful activity, to develop an understanding of the materials and methods of science are without number.

It should go without saying that this method of study ignores the academic boundaries of " subjects." When seeking to learn the best ways of preventing and extinguishing fires, of conserving health through sanitation of the home, of saving money in the purchase of new clothes or food, nobody cares whether his data are derived from botany or histology, physics or archaeology; what he does care for is that he shall find and organize facts so that they will give him desired information.

It is objected that there will be no unity to such a course and that teachers have insufficient preparation to draw upon the different sciences that will be involved. The first objection is voiced in the thesis that "Any scheme of education that does not emphasize relations in the knowledge acquired has very little educational value." This ambiguous thesis will be approved by both sides because each reader will interpret it

so as to express his own ideas. The essential difference is manifest when one asks to what the relations must be. It is manifestly impossible to conceive of anything without relations; the question, then, is what relations in elementary science teaching shall be emphasized, those of fact to fact with a resultant academic organization, or those of fact to purpose with resultant power. Outside his special narrow field each and every one of us attempts the second kind of relationship. When confronted with a novel situation one tends to respond with some reaction connected with a similar suggested situation; if that fails to give satisfaction and one is sufficiently intelligent to curb the impulse toward vague and random reactions, an uneconomical trial and error method, he attempts to learn precisely what the perplexity is, how it is caused, and what a satisfactory solution would be. In proportion as he is possessed of prior similar experiences, facts usually related in series, and imagination, he proposes to himself numerous hypotheses. As he proposes each one he is likely to give it a rapid extension until it is invalidated by some situation or until it seems strong enough to demand more serious consideration. This consideration usually necessitates the securing of facts from any field whatever and the relating of them in such a way as to test the hypothesis: facts may be secured by reading, experiment, or investigation of any kind; but whatever are secured are first sought with a definite purpose. After an hypothesis is substantiated, and not before, one may be interested to relate it to other similar results and thus postulate and prove a theory or a law. It is in the details of such a process, which is followed more or less skillfully by the illiterate as well as by the highly trained, that one may improve his power of thought, his power of scientific thinking; and it is only reasonable that children should be trained to use well a method which they are sure to use any way.

The other objection, that teachers have insufficient training to teach general science, is unfortunately true. It is true for general science as for history, English, mathematics, and every other secondary school subject, but probably no more so. Most of those who have studied science in college have concentrated on one or two of the special fields; they are supposed to be

masters of the elements of their especial subjects, and it is certain that they know, or have known many facts that never find a use and should never be presented to high school classes. But, as Eikenberry has shown, these same masters of one subject do actually when they undertake teaching attempt to present from one to five other special science subjects. It is not that this is good, but, rather, it is no better than the proposed plan that in General Science they shall draw what they need from other subjects for the intelligent solution of problems felt to be personally worth while. It would be well, of course, for every teacher to know everything; but that millennial condition lacking, it is not quite clear why a teacher who has "mastered the method" through the study of one or two special sciences can not at need find such facts as are required in the solving of the problems developing in the adolescents' interests.

Certainly teachers will be as competent to present general science as they are to present a special science, when the former has been as thoroughly understood and when text-books as truly represent the accepted principles. As previously stated, the existing text-books are more or less compromises, as several of the authors have frankly stated. It seems that it must be necessary for future texts, if they are to reflect the spirit of the subject, to present their highly interesting and valuable material in the form of projects or problems, and, furthermore, to abandon all idea of a fixed sequence of the topics. Professor Woodhull proposes practically that a large number of valuable projects be outlined and published separately, so that a teacher may from them select such as the pupils' needs and interests at the time demand. If General Science is to persist, its advocates must make accessible, and that quickly, the outlines of a sufficient number of projects to provide opportunity for selection and to ensure treatment as projects and not as the usual laboratory exercises.

It seems that if the psychological organization be adopted a few changes in modern science methods are inevitable. Laboratory work, which has done so much to reify the principles of science, is in grave danger of becoming generally formalized: there can be little doubt that many exercises now required of pupils in the laboratory could be omitted without serious loss.

Demonstration and even information are satisfactory substitutions for a number of time-consuming experiments, especially in classes of beginners. Pupils should have primarily excursions to the fields, woods, factories, and museums, each of which must be as carefully prepared for and used as any other school exercise would be; after these may come simple laboratory demonstrations and exercises explaining details, developing principles and affording opportunity for finding or making many applications. In the laboratory the apparatus should be simple, providing for such exactness as satisfies everyday life. There is time enough later in education for the use of instruments that a layman can not afford, to ascertain results that he does not need, with a precision that he will not appreciate. Such apparatus as is provided the pupils should use with a speed and accuracy that would find approval in commercial life. Waste of time is no more excusable in the laboratory than it is elsewhere.

The teacher of general science has an opportunity, too, in common with the teacher of special sciences, to increase the permanent results of his work, the opportunity of presenting the same operations and principles again and again until they are really possessed by the students. In other subjects of study it is common practice, based on experience, to recall paradigms, rules, axioms, theorems, etc., from time to time in varied situations until the laws of memory are satisfied; in science too frequently a subject or a principle is taught by exposition and drilled only by exercises following immediately upon the instruction. Unless facts are brought above the threshold of consciousness and kept there by repeated demands distributed over a considerable period of time they are not likely to be permanently retained. Unrelated and unmotived drill may be effective, but it is uneconomical. The recall is most profitable if growing out of a real situation demanding the facts or principles.

Interesting readings in science should from time to time be recommended, if not required, to stimulate the laggard, to satisfy the accelerant, and to offer everyone information supplementing that presented in class. To one who has made no especial inquiries the popularity of scientific articles and magazines among high school pupils, both boys and girls, is astounding. Fortunately there is an increasing number of good books

and magazine articles, some of which can be read by the pupils, some to the class by the teacher, and some read by the teacher and summarized for the class. Someone could perform a useful service by indexing the best science material in periodicals like *Popular Mechanics*, *The Scientific American*, *Harper's Magazine*, and *St. Nicholas*, and in such books as Jordan's "Science Sketches," Williams's "Miracles of Science," Bird's "Modern Science Reader," and Thompson's "Wonder of Life."

This is the situation as it appears to one interested in the general field of secondary education. Observation in many schools in twenty-six of the states of the Union and personal discussion with numerous teachers have had a marked influence in determining these opinions. But like other opinions they are for many reasons fallible. A satisfactory answer to the problem or series of problems can be secured only by means of experiment, whether it be the wasteful experiment of trial and success or the scientific experiment of controlled groups with the final results carefully measured. One would naturally suspect that scientists have already abundant results of such measurements with which to construct a program, but none that are comprehensive or convincing has been found. It is not sufficient to ask classes after a year's work in general or special science the meaning of isolated terms like *pancreas* or *paramoecium*; the examination must test their interest in science, and their intelligent election of further courses or independent reading, their knowledge of their own interest, aptitudes, and capacities as related to scientific materials, their stock of specific useful "connections" for habits, and finally their understanding and appreciation of the phenomena of the environing universe. Until such measurements are made and reported teachers must use in formulating their common-sense judgments the principles of scientific thinking: they must be open to conviction, they must sincerely seek facts, they must renounce passion and prejudice, and they must consider the case of each member of the class in the light of his individual need and ability. When the bubblyjock of tradition loses its terrors and each one faces as they are facts of child-life as well as facts of subject-matter, we shall have in our school rooms improved scientists as well as improved science teaching.

PROJECTS IN SCIENCE

By JOHN F. WOODHULL

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A certain man became the possessor of a motor boat which filled his summer with projects for interesting study. By inquiry, by reading, and by experiment, he found that a very small amount of gasoline vaporized and mixed with each cylinder full of air constituted an explosive mixture which, when fired, furnished the power. He found that the proportions were fixed within very narrow limits; say, four drops to each quart of air. Varying the proportions to either three or five drops would result in a weaker explosion; hence the necessity of a very careful adjustment in the carburetor.

To explode this mixture an electric spark must be produced inside the cylinder at the proper instant. This spark was produced by a battery of dry cells. Rubbing together two wires leading from opposite terminals of this battery would produce a faint spark, but this spark would not explode a mixture of gasoline and air; it was not hot enough. Indeed, the coal upon the end of his cigar would not explode the gasoline and air. A coil of wire surrounding a soft iron core must be introduced into the circuit to produce a spark having sufficient heat to ignite the mixture.

As one searching through an encyclopedia for certain information often gets sidetracked upon some other search, so this man spent many days or even whole weeks passing through one project to another. The mysterious action of the coil; the tracing of the current through its complete circuit; the timing of the spark by means of a commutator; the oiling devices; the circulation of water for cooling the engine; the clutch for engaging the engine with the propeller, to go forward or backward or stop. All these and many other projects seemed to him to be real physics; nay, more and better than real physics.

A second man possessing an automobile, pursued a dozen or two projects of study more absorbing than anything else which he had on his mind during the whole winter. With books of instruction furnished by dealers he studied carburetors, throttles, chokers, " vacuum feeds," high tension magnetos, spark plugs, cooling devices, self-starting devices, differentials, clutches, gears, countershafts, breaks, horns, springs, " shock absorbers," tires, " non-skid " devices, mufflers, silencers, steering devices, lighting systems, lubrication, storage batteries, cycles, horsepower, generators, motors, relative merits of engines with four, six, eight and twelve cylinders, non-freezing solutions, thermosyphons, pumps, care of varnish, speedometers, ammeters, the retarding of the spark on going up a hill, the causes of " knocking " in an automobile engine, etc.

A third man bought a small farm and began to read farmers' bulletins which he procured from the Government Bureau at Washington. For three months he was the butt of ridicule as a " literary farmer," but nothing ever took such real possession of his mental faculties as that project of making the ten acres produce all the grass it was capable of. In the course of a few years, according to an account which he published, the neighboring farmers were eager to learn how he had succeeded in producing seven blades of grass where one had previously grown. These studies appeared to him to be real botany, nay, more than botany, real science.

A fourth man spent a few days at Mammoth Cave and came back with projects which seemed to him to be the most interesting studies in the fields of geography, geology, zoology, botany, physics, and chemistry. He was so enthusiastic over the results of these studies that they entered into every speech he made for the next year or so.

A fifth man spent a summer by the seaside and heard faintly on a few occasions the sounds of a bell buoy anchored four miles away. He reflected upon the problem of what conditions must obtain in order that that sound might carry so far. He questioned many men and read upon the subject until he got his mind possessed with an explanation which forms the substance of an interesting article.

These five men, all intelligent men—at least they are pro-

fessors—have testified that these projects furnished them exceedingly fruitful themes for study. They will not admit that those studies lacked organization nor that they were desultory and scrappy. None of them was prepared for these studies by specializing in those fields any more than Pasteur was prepared by his formal education for the six or eight great projects which made him one of the greatest scientists and the greatest Frenchman that has lived.

Young people have plenty of projects which we may help them to study if we choose. It is not often possible to hinder their studying them if we will. They furnish the natural means for starting them on a scientific career. Why do we require young people in school to use a different method of study from that used by all of us outside of school? Why should we be averse to using methods of study in science which are considered eminently proper in other departments? Why should instruction be for specialization rather than for "magnanimity and enlightenment"? Why this mania for codifying subject matter which has cankered education during the last two decades?

If the two or three hundred "fundamental principles" in physics, for example, are fundamental, why do intelligent people having once learned them forget them without regret? Why do engineers have little use and much contempt for them? Why do those engaged in research in fields of physics ignore them? Is it tacitly for purposes of mental discipline that they are taught? Are students in schools and colleges made into scientists by learning the so-called fundamental facts, or by practicing the methods of a scientist in finding the solution of real problems?

Drowning Trees—A Project

The following project is taken from the note-book of a young man who spent a summer on a farm.

We dammed a small stream to make a skating pond and a place for cutting ice in winter. The pond which was thus formed surrounded certain trees in the valley which had often suffered for water during dry spells. Some of us thought this would be a benefit to the trees, inasmuch as they would here-

after always have an abundance of water. Furthermore, the stream would now deposit about the roots of the trees an abundance of the food which they would need. In spite of our good intentions, however, the trees soon died. Upon inquiry we learned that the trees had been drowned. They needed air at the roots quite as much as water. We were then reminded that a neighbor when he regraded the land in front of his house had built a circular retaining wall around a tree to keep the earth from being banked against the tree itself and excluding the air. Another man said that it would do quite as well to pile loose stones against the tree and throw earth over them, and let the grass grow quite up to the tree. Air would readily find its way to the roots through loose soil, as indeed it does to all trees. He said that earth worms, ground moles, and various burrowing animals loosen up the soil and let the air in. The earth is ventilated annually in preparation for the summer crops. When water in the ground freezes it expands; we say it heaves the ground up. Then when in the spring time the ice melts and the water drains out, much room is left for air to come in. Thus land which may be very hard in autumn becomes soft and spongy in spring.

Spring is the time to mend fences. One can dig post holes easily then. Spring is the time to cart off from the fields the stones which the winter frosts have brought to the surface.

Soils which are too clayey to let the water drain out of them may for lack of air sustain only a very stunted growth of vegetation. The mixing of gravel with such land, thus letting in air, will sometimes make it produce abundantly. All soils are improved by having a network of drains a few feet below the surface, so that all the water which will drain off may do so. The ideal arrangement for plants is a loose, porous soil with air filling all the spaces between the particles and only so much water present as will cling to the surface of the particles. This is called capillary moisture, to indicate that the spaces must be very small so that water will creep through the soil as kerosene does through the lamp wick.

The care of potted plants requires continual thought about maintaining the balance between air and water at the roots. If the soil is very rich and has little gravel in it and if water

is always poured on from above, the soil gets packed down so hard that air may not enter. The hole in the bottom of the pot permits of under-draining, but the water soon makes channels down through the mass, and it does not spread to all the rootlets. In the hardly packed earth they may be suffering for both air and water in spite of the fact that the pot is porous and that it receives frequent watering. By this consideration soil may be too rich as well as too poor. It must have air and moisture quite as much as fertilizing material. If the soil is rightly proportioned it will suffice to pour water into the saucer. The proper amount of both air and water will creep through the soil.

Persons who set out young plants, thinking that the tender roots require very soft soil, sometimes make the mistake of not packing the dirt around them firmly enough. The result is that while they get plenty of air they have too little moisture. Moisture creeps by capillarity through very small spaces, not large ones. If the soil is properly proportioned the best way is to press it as firmly as one can around young plants when they are first being set out.

The surface of the ground should be frequently scratched over to make the spaces between the particles at the surface too large for the water to creep by capillarity quite to the surface and pass off by evaporation. This is one great reason for hoeing, harrowing, and cultivating fields. Another is to kill weeds.

Some people have asked whether earth worms rain down since they are seen in such great numbers crawling on the surface of the ground after a rain storm. The fact is that they crawl out of the ground to get air, having been drowned out. They cannot live without air as long as the trees and some other plants can. There are certain plants, however, which are able to live in earth that is perpetually flooded with water, as we see about all ponds and streams.

In winter, when there is lack of air and water at the roots, lack of heat to stimulate chemical activities, lack of green matter in leaves to respond to the actinic ray of the sun, plants put winter blankets upon their buds and on their root tips and remain dormant.

The Mill Pond—A Project

BY W. G. WHITMAN

We lived at one time near a small mill pond where the muddy waters coming from swiftly running streams were cleared and sparkling water passed out over the dam. Here we skated in winter, and went boating in summer. Often we would take a basket of frogs, caught along the shore, and row out into the bog off one side of the pond and fish for pickerel. Time after time our boat bumped into stumps or became grounded upon the hidden logs under water. When we stepped overboard to let our boat rise and float over a log our bare feet would sink deep into the soft black muck, loosening an offensive gas which came bubbling to the surface of the water. We were sometimes frightened upon entering the boat again to find small muscular worm-like creatures, which we called bloodsuckers, burrowing into our legs. Some people called them leeches and said that doctors used them to draw blood from their patients.

Many were the times, while fishing, that our lines became entangled in the pickerel grass and lily pads. But all the obstacles merely incited us to renewed effort. Never did we question *why* there were stumps, logs, muck, foul gas, bloodsuckers, and lily pads there. Never had we a thought but that they always had been and always would be there.

One day on one of our trips we met a young man from the neighboring college. He asked us many questions and told us many things, which so aroused our curiosity that we determined to find out all that we could about the history of the mill pond and its inhabitants. We learned from the mill owner that the dam was built there about twenty-five years ago. Before that only a small stream of water flowed through a wooded area. The dam was built in that place because from the rapid fall in the stream a good head of water could be secured for power. How often before this had we eagerly watched the saw go screeching through the logs, with never a thought about the power that turned the saw! Upstream were hills covered with timber and downstream was much rolling or level land devoted to farming.

It was easy for us to explain the presence of the stumps and logs in the bog. The trees had been drowned after the dam had been built when the water backed up and kept the air from their roots. We were told that the decaying matter of plant origin gave rise to the foul smelling marsh gas, which is also present in the gas burned for light and heat in cities.

We learned many things about the life in the water which greatly interested us. We thought the frogs we were using for bait came down with the rain when they were small. And we laughed at the young college man when he told us they came from those bunches of jelly which floated around the shallow water by the shore. In the spring we took one of these masses of jelly home and kept it in a large jar of water. We put some water plants into the jar and watched the development for the whole summer. Imagine our surprise to see funny looking tadpoles grow, change, get legs, lose their tails, and finally become real frogs.

This study made us curious to know more about the life of the fish in the pond. We found " nests " of eggs which they laid in the shallow water where the sun could reach and warm them. We learned that they feed upon insects, small forms of water life and sometimes upon small fish. In the winter they are protected against the cold by the ice covering.

By a fortunate natural law water in cooling acquires its greatest density at 39° F., just a few degrees above its freezing temperature, and in cooling to the freezing temperature (32° F.) it expands and becomes less dense. You know that stones sink in water because they are denser than water. Just so, water that is denser than other water around it, will sink. Hence the densest water, that at 39° F., will be found in the bottom of the lake in the winter. This explains how it is that water freezes at the surface of the lake and that the water in the lake never goes much below 39° F. all winter long. The lake does not freeze solid because when water freezes it increases in bulk. Thus volume for volume, ice is lighter than water. Ice has only nine-tenths the density of water and therefore floats and acts like a blanket, preventing the cooling of the water below.

We know the fish are in the lake in the winter, for while skating we have seen men catch them through holes in the ice.

Cutting Off a Limb—A Project

BY LOTHROP D. HIGGINS

The class was studying woody stems. John said that a neighbor had laughed at the way his brother cut off a limb but without saying what was wrong or how he should have sawed it. Asked about it, John said that the branch had been cut off about two inches from the trunk, and that his brother had begun to saw on top of the limb. As none of the class seemed to know what was wrong in this, or what would have been right, they were given the matter to investigate. Their sources were their present knowledge of stems, plenty of trees to observe, and books; but these boys and girls had solved problems before, and they sought books sparingly, liking rather the joy of earning their knowledge than getting it by short cuts.

Next day we sorted the information brought in. We had previously learned that sap goes upward (or outward) through the woody part of stems, and downward through the inner bark (the green layer). The upgoing sap is very largely water, which is going from the roots to the leaves; the food materials, from which the parts of the plant grow, are chiefly in the sap that goes through the bark and which has come from the leaves. In addition to this, one boy had found that diseases may attack trees from without, if their wood is exposed, much as disease may get into our bodies through wounds in the skin. Another pupil had brought an old stump four inches long that he had sawed from a tree—the remnant of a limb that had been cut off at that distance from the trunk. Its outer end was black and the center of the wood was gone; the bark had dried and fallen away from the wood. At the end where it had joined the trunk a spot of soft wood showed that the decay (disease) must have gone even into the trunk. One of the girls described a scar she had seen on a tree, where the bark had grown till it almost covered the spot where a limb had been removed. She said this cut had been made very close to the trunk.

It was decided that the bark serves as a protection against disease, but when it is removed such disease may enter the

wood and spread till it even destroys the tree. If a limb is cut off even with the trunk, the bark all around the spot is alive and full of flowing sap, so that it may grow over and close the wound. But if the cut is made an inch or more out on the branch, the bark around it cannot grow, for it can get no sap. Obviously the liquid which flows in the bark inward from the leaves cannot flow after the whole branch with its leaves has been removed. Thus the wound can be healed if it is on the side of a stem but not if it is on the end, and the trick is to make the wounds come on the larger limb—to leave no stump at all.

But one boy, having exhausted his own wit, had gone to a man who was known for his fine orchards. He told us further that before beginning to saw downward on a limb we should first cut upward on its under side for a short distance. This, he said, was to prevent the bark from being stripped down the trunk if the heavy branch should fall before being fully cut through.

We now thought that we understood why the man had laughed at a boy who sawed two inches out from the trunk and made his whole cutting from the top. But the class then read what they could find from books on trees and agriculture. They learned that small branches, up to an inch in diameter, might be cut with strong pruning shears, but for larger ones sawing is best. An axe or a hatchet makes too rough a wound. If the limb is large, it may be desirable to trim the edges of the cut, along the sides—always keeping the purpose in mind, which is to remove all wood and bark through which sap will not afterwards flow. But the large limbs may leave wounds so extensive that the bark will be years in covering them. Meantime disease may get its hold upon the trunk. To prevent this the wood may be thoroughly painted with a thick paint of linseed oil and white lead; in many cases one application will last till the bark has grown over the wound. If one were careful to cut limbs always in this way, and to trim such branches as are accidentally broken off, he might add many years to the life of a tree.

AN IMPROVED SCALE FOR MEASURING ABILITY IN READING—(*Concluded*)*

By EDWARD L. THORNDIKE

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The Derivation of Scale Alpha 2

The technique of evaluating the difficulty of each question of each set is rather intricate. I shall not report here the detailed methods of each case, nor give the detailed calculations. For the sake of anybody who is interested in the methods concerned, some samples will be presented, particularly of the method of determining the unknown difficulty of a new set in terms of the known difficulty of a set already standardized. The other methods have been already described in Buckingham's "Spelling Ability: Its Measurement and Distribution." For the sake of anybody who wishes to evaluate the sets on other hypotheses than those used here, all the data are presented both in gross and percentile forms. For the sake of future workers the value of sets or parts of sets evaluated but not used in the scale itself are given.

The assumptions used in determining the values 5¼, 6, 7, 8, 8⅔, and 9 are as follows: Call *difficulty for paragraph reading* a characteristic of a paragraph and question about the paragraph, much of which produces a large percentage of wrong responses to the questions, and little of which produces few, the *individuals concerned being the same.*

Call *achievement in paragraph reading* that thing much of which enables an individual to respond correctly to a paragraph and a question about the paragraph involving much "difficulty for paragraph reading," whereas an individual of less "achievement" could respond correctly only to a "paragraph and a question about the paragraph" of less difficulty.

* The first part of this article, giving Scale Alpha 2, appeared in the November, 1915, Teachers College Record.

Call a *paragraph and a question about the paragraph* a "scale element."

Assume that within any grade, "achievement in paragraph reading" is distributed approximately in the form of the so-called normal probability surface, so that between the median and plus or minus multiples of the variability up to about 1¼ S. D., or about 2 Q, the percentages included will be approximately as in the appropriate tables for the normal probability surface.

Assume that the variability of any grade from the fourth to the twelfth (senior year of high school) is approximately equal to that of any other.

Let Q equal that difference in difficulty for reading between two scale elements such that one is read correctly by 50 per cent of the pupils of a grade and the other by 75 per cent of the same pupils (to hold true for grades 4 to 12). By our hypotheses Q will be equal, whatever the grade, and will be equal to the Median Deviation or Semi-Interquartile Range of the variability of any grade in achievement in paragraph reading. Use 1.00 for Q.

The assumptions so far relate to the relative differences between successive sets of scale elements in the scale. The values 5, 6¼, 7, 8, 9, 9⅔, and 10, or 6, 7¼, 8, 9, 10, 10⅔ and 11, or 3, 4¼, 5, 6, 7, 7⅔, and 8, might all be equally consistent with them. To place the values in relation to an absolute zero, or "just not any difficulty in reading," we have to study elaborately the abilities of children in grades 1, 2, and 3 or make a provisional estimate. For the present I have done the latter.

Samples of Methods of Evaluation of the Scale Elements

The designations, Set A, Set B, Set C, Set D, Set H, Set I, Set J, etc., refer to the sets as they appear in the Teachers College Record of September, 1914, pages 44 to 64. The designations, Difficulty 4, Difficulty 5.25, Difficulty 6, etc., refer to Scale Alpha 2, as presented in the November, 1915, Record.

All numbers are calculated from an arbitrary and temporary choice of 10.00 for the median difficulty for grade 8 in schools C and D. The scale-values finally used are in every case 1.08

below those quoted here, the final choice of relations to an absolute zero being such as will make the median difficulty for grade 8, 8.92 above such a zero.

Evaluation of the Difficulty of Set D, Elements 1, 2, 3, and 4 of Difficulty 8 of Scale Alpha 2

The eighth grades of School C and School D are equal in reading ability. Call the difficulty just met by fifty per cent of these pupils 10, unity being Q (the median deviation of the 8th-grade pupils in reading ability). Assume, as, throughout, that the distribution of reading ability within a grade is approximately that of the Normal Probability Surface. Then the difficulty of D 1 is 9.54 if we use School C, and 9.42 if we use School D, to compute it, averaging 9.48. In a similar way we have for D 2, 9.02 and 8.88, average 8.95; for D 3, 9.27 and 9.15, average 9.21; for D 4, 9.22, and 9.62, average 9.42. The D set as a whole averages 9.22. This determination is from 410 pupils.

Using sets C and D combined, 57.6 per cent of the 8th-grade pupils of School C reach or exceed the median of the 7th-grade pupils. Using sets L and M, the percentage is 58.1. The corresponding percentages of the 7th on the 8th are 41.7 and 43.1. The median difficulty for grade 7 is thus .3 below that for the 8th grade.

Using sets A, B, C, and D combined, 78.1 per cent of the 8th-grade pupils in School D reach or exceed the median of the 7th-grade pupils; 23.2 per cent of the 7th-grade pupils reach or exceed the median of the 8th-grade pupils. The median difficulty for grade 7 in School D is then 1.12 below that for the 8th grade.

The median ability of the 7th grade of School C is .30 Q below that of its 8th grade, and the median ability of the 7th grade of School D is 1.12 Q below that of the 8th grade. D 1, D 2, D 3, and D 4 are, respectively, on the basis of the 7th grade returns, .15 Q, .60 Q, .26 Q, and .60 Q easier than the median difficulty for grade 7 in School C, and .40 Q harder, .60 Q easier, .29 Q easier, and .40 Q harder than the median difficulty for grade 7 in School D. They are then .45 Q, .90 Q, .56 Q, and .90 Q. easier than the median difficulty for grade 8 by the School

C results; and are .72 easier, 1.72 Q easier, 1.41 Q easier and .72 easier by the School D results. On the average, they are, by these 7th grade returns, of difficulty 9.41, 8.59, 9.01, and 9.19 (for the set as a whole, 9.05). This determination is from 420 pupils.

Combining the two results we have 9.45, 8.77, 9.11, and 9.31 (averaging 9.16) as the difficulty of D 1, D 2, D 3, and D 4. These measures are the best obtainable at present and will be used as points of departure for determinations of the difficulty of other sets.

Evaluating the Difficulty of Set C, Elements 1, 2, 3, and 4 of Difficulty 6 of Scale Alpha 2

For School D, using the scores in sets A, B, C, and D combined, we have the following as the percentages of pupils in each grade reaching or exceeding the median for each grade.

23.2%	of 7th grade pupils reach or exceed the median for grade	8
13.1%	of 6th " " " " " " " " " "	
5.63%	of 5th " " " " " " " " " "	
4.2%	of 4th " " " " " " " " " "	
78.1%	of 8th " " " " " " " " " "	7
36.0%	of 6th " " " " " " " " " "	
20.0%	of 5th " " " " " " " " " "	
13.3%	of 4th " " " " " " " " " "	
87.1%	of 8th " " " " " " " " " "	6
64.5%	of 7th " " " " " " " " " "	
31.3%	of 5th " " " " " " " " " "	
18.7%	of 4th " " " " " " " " " "	
92.45%	of 8th " " " " " " " " " "	5
84.2%	of 7th " " " " " " " " " "	
65.8%	of 6th " " " " " " " " " "	
34.2%	of 4th " " " " " " " " " "	
96.56%	of 8th " " " " " " " " " "	4
85.0%	of 7th " " " " " " " " " "	
78.8%	of 6th " " " " " " " " " "	
66.4%	of 5th " " " " " " " " " "	

Using these facts we find the differences of the median difficulty for each grade from the median difficulty for grade 8 to be estimated as follows:

4th	from	8th	by	direct	comparison							2.61
"	"	"	"	4	from	5	and	5	from	8		2.83
"	"	"	"	4	"	6	"	6	"	8		2.92
"	"	"	"	4	"	7	"	7	"	8		2.71
"	"	"	"	4	"	5, 5	from	6,	and	6	from	8 2.94
"	"	"	"	4	"	6, 5	"	6,	6	from	7, and 7 from	8 2.93
"	"	"	"	4	"	6, 6	"	7,	and	7	from	8 2.91*

* It should be noted here that the agreement of these different estimates of the differences between the median 8th grade difficulty and the median

The 4th grade median difficulty is therefore put at 2.86 below 10.00, or at 7.14.

5th from 8th by direct comparison.....2.22
" " " " 5 from 6 and 6 from 8.....2.23
" " " " 5 " 7 " 7 " 8.....2.48
" " " " 5 " 6, " 6 " 7, and 7 from 8.....2.32

The 5th grade median difficulty is therefore put at 2.34 below 10.00, or at 7.66.

6th from 8th by direct comparison.....1.67—
" " " " 6 from 7 and 7 from 8.....1.66+

The 6th grade median difficulty is therefore put at 1.66 below 10.00 or 8.34.

The 7th grade median difficulty is 1.12 below 10.00 or 8.88.

225 pupils in grade 4 of School D gave percentages correct for C 1, C 2, C 3, and C 4 as follows: .502, .622, .631 and .622. The corresponding values, using 7.14 as the 4th grade median difficulty, are 7.13, 6.68, 6.64, and 6.68.

293 pupils in grade 5 of School D gave, as percentages correct, .638, .747, .744, and .621. The corresponding values, using 7.66 as the median 5th grade difficulty, are 7.14, 6.67, 6.68, and 7.21.

201 pupils in grade 6 of School D gave, as percentages correct, .821, .816, .851, and .756. The corresponding values, using 8.34 as the 6th grade median difficulty, are 6.98, 7.00, 6.80, and 7.31.

Averaging these values we have 7.09, 6.78, 6.71, and 7.40, with a general average of 7.00, as the difficulty of Set C. This may be accepted as a fairly trustworthy determination, being from 729 pupils of the grades for which Set C is an appropriate test.

Evaluating the Difficulty of Set L, Elements 1, 2, 3, and 4 of Difficulty 8⅔ of Scale Alpha 2

Using this method of determining the median ability of a grade and then determining the difficulty by the percentages correct, taken in connection with that median difficulty, we have

4th-grade difficulty is evidence that our assumptions that the variabilities of the different grades are equal, and that their distributions are approximately of the normal-probability-surface type, are not in serious error.

for questions 4, 5, 7, and 8 of Set L the following results from 202 7th-grade pupils, 178 8th-grade pupils, 177 9th-grade pupils and 81 10th-grade pupils: 9.82, 9.28, 9.93 and 10.01.

The difficulty of Set L may also be computed from the comparison of the percentages of correctness with it and with Set D. For School C the facts for grade 8 are that 177 pupils showed percentages correct, as follows:

D				L			
1	2	3	4	4	5	7	8
.621	.746	.689	.701	.689	.576	.458	.503

By the proper calculations L 4 differs in difficulty from D 1, D 2, D 3 and D 4 by being .27 easier, .25 harder, 0 easier and .05 harder, respectively. Since D 1, D 2, etc., are, by our best estimate, 9.45, 8.77, 9.11 and 9.31, L 4 is, in so far forth, placed at 9.18, 9.02, 9.11 and 9.35, averaging 9.17. L 5, similarly, is related to D 1, D 2, etc., by —.18, —.70, —.45, and —.50, and is placed at 9.63, 9.47, 9.56, and 9.81, averaging 9.62. L 7, similarly is related to D 1, D 2, etc., by —.62, —1.14, —.89 and —.94 and is placed at 10.07, 9.91, 10.00, and 10.25, averaging 10.05. L 8, similarly, is related to D 1, D 2, etc., by —.45, —.97, —.72, and —.79, and is placed at 9.80, 9.74, 9.84, and 10.11, averaging 9.90.

In the case of the 202 pupils of grade 7 the percentages correct are:

D				L			
1	2	3	4	4	5	7	8
.540	.658	.569	.658	.475	.574	.416	.500

The relations are for L 4, —.24, —.69, —.35, and —.69 respectively; and the corresponding values are 9.69, 9.46, 9.46, and 10.00, averaging 9.65.

For L 5 the relations are, +.13, —.32, +.02, and —.32; and the values are 9.32, 9.09, 9.09, and 9.50, averaging 9.25. For L 7 the relations are, —.47, —.92, —.58, and —.92, and the values are 9.92, 9.69, 9.69, and 10.23, averaging 9.88. For L 8 the relations are —.15, —.60, —.26, and —.60; and the values are 9.60, 9.37, 9.37, and 9.91, averaging 9.56.

We have, then, so far three estimates using the data of School C.

By the direct results in grades 7, 8, 1 H and 2 H	9.82	9.28	9.93 and 10.01
" " comparison with D 1, etc., in Grade 8	9.17	9.62	10.05 and 9.90
" " " " " " " 7	9.65	9.25	9.88 and 9.56

The first of the three deserves more weight than either of the others, probably as much as both. Weighting it as equal to both, we have 9.62, 9.36, 9.95, and 9.87 as the final result from the data of School C.

Data are available for the second sort of estimate from 162 pupils in grade 8 and 142 in grade 7 of School D. For grade 8 we have as percentages correct

D				L			
1	2	3	4	4	5	7	8
.630	.765	.722	.586	.395	.568	.475	.475

The relations for L 4 are —.88, —1.46, —1.26, and —.71; and the corresponding values are, 10.33, 10.23, 10.37, and 10.02, averaging 10.24. The relations for L 5 are —.28, —.86, —.66, and —.11, the corresponding values being 9.73, 9.63, 9.77, and 9.42, averaging 9.64.

The relations for L 7 are —.48, —1.16, —.96, and —.41, the corresponding values being 9.93, 9.93, 10.07, and 9.72, averaging 9.91. The relations for L 8 are the same as for L 7.

For grade 7 we have as percentages correct

D				L			
1	2	3	4	4	5	7	8
.387	.648	.528	.373	.190	.317	.289	.338

The relations for L 4 are —.88, —1.86, —1.40, and —.82; the values are 10.33, 10.63, 10.51, and 10.13, averaging 10.40. For L 5 they are —.29, —1.27, —.81, and —.23; 9.74, 10.04, 9.92, 9.54, average, 9.81.

The relations for L 7 are —.40, —1.38, —.92, and —.34, the corresponding values being 9.85, 10.15, 10.03, and 10.65, averaging 10.17. For L 8 they are —.20, —1.18, —.72, and —.14, the values being 9.65. 9.95, 9.83, and 9.45, averaging 9.72.

From School D then we have:

	L 4	L 5	L 7	L 8
By grade 8	10.24	9.64	9.91	9.91
" " 7	10.40	9.81	10.17	9.72
Average	10.32	9.73	10.04	9.82

We have also the data from 127 pupils in grade 8 of schools E and F combined, the percentages correct being:

D				L			
1	2	3	4	4	5	7	8
.433	.677	.504	.386	.331	.512	.425	.362

The relations here are, for L 4, —.40, —1.33, —.66, and —.21, the corresponding values being 9.85, 10.10, 9.77, and 9.52, averaging 9.83. For L 5 they are +.29, —.64, +.03, and +.47, the values being 9.16, 9.41, 9.08, and 8.84, averaging 9.12. For L 7 they are —.03, —.96, —.29, and +.15, the values being 9.48, 9.73, 9.40, and 9.16, averaging 9.44. For L 8 they are —.28, —1.21, —.54, and —.10, the values being 9.63, 9.98, 9.65, and 9.41, averaging 9.67.

Combining the estimates from the data of schools C D and E F combined, weighting the first 3, the second 2, and the third 1, we have as our best present estimate of the difficulty of Set L the average being 9.78.

Element	4	5	7	8
Difficulty	9.89	9.44	9.90	9.84,

By such methods as those just described the values of each scale element have been estimated, using the data of Table II.

TABLE II

The Data Whence Scale Alpha 2 Is Derived

The upper line for each grade gives the number of right responses
The lower line for each grade gives the percentage of right responses (893 = 89.3%, etc.)

Grade	Dif. 4			Dif. 5½				Dif. 6							Dif. 7						
	1	2	3	1	2	3	4	1	2	3	4	5	6	7	1	2	3	4	5	6	7
School C, grade 7																					
$n = 202$																					
8																					
$n = 177$																					
9																					
$n = 178$																					
10																					
$n = 81$																					
11																					
$n = 96$																					
12																					
$n = 94$																					
School D, grade 4	201	215	215	160	173	169	179	113	140	142	140								68	63	87
$n = 225$	893	956	956	711	769	751	796	502	622	631	622								300	278	383
5																					
$n = 293$				240	252	249	232	187	219	218	182	215	202	193							
				819	860	850	792	638	747	744	621	736	692	661							
6				158	179	168	166	165	174	171	152										
$n = 201$				786	890	836	826	821	816	851	756										

	7							202	195	185	159											
	$n = 218$							927	894	849	729											
	8							225	214	218	198											
	$n = 233$							966	918	936	850											
School E, grade	5	60	59	61	49	50	48	52	35	43	50	33	39	40	34	32	24	34	12			
	$n = 63$	952	937	968	778	794	762	825	556	683	794	524	619	635	540	508	381	540	190			
	6				74	76	78	77	52	61	73	66	38	56	53					41	46	45
	$n = 81$				914	938	963	951	642	753	901	815	469	691	654					506	568	556
	7																			62	66	62
	$n = 77$																			805	857	805
	8																			54	50	55
	$n = 69$																			783	725	797
Percentages for grades 5 and 6 combined					854	875	806	896	604	722	854	688										
Scale F, grades 5 and 6 combined		105	112	109	89	99	91	104	57	87	93	83	69	44	62					41	45	43
	$n = 113$	929	991	965	788	976	805	920	504	770	823	735	611	389	549					363	398	381
	7																			37	44	32
	$n = 62$																			597	710	516
	8																			45	41	29
	$n = 58$																			776	706	500

TABLE II—(*Continued*)

Grade	Dif. 8								Dif. 8¾				Dif. 9				
	1	2	3	4	5	6	7	8	1	2	3	4	1	2	3	4	5
School C, grade 7	109	133	115	133					96	116	84	101					
$n = 202$	540	658	569	658					475	574	416	500					
8	110	132	122	124					122	102	81	89					
$n = 177$	621	746	689	701					689	576	458	503					
9									63	112	86	53	85	61	82	78	44
$n = 178$									354	629	483	298	478	343	461	438	247
10									34	60	39	38	39	36	43	39	30
$n = 81$									420	741	481	469	482	444	531	482	370
11													49	56	59	57	52
$n = 96$													511	604	615	594	542
12													67	56	70	44	54
$n = 94$													712	596	745	468	574
School D, grade 4	47	104	41	25													
$n = 225$																	
5	51	167	82	45													
$n = 293$																	
6	35	121	85	53	40	70	111	107									
$n = 201$	174	602	423	264	199	348	552	532									
7	86	143	126	86					percentages from 142								
$n = 218$	394	656	578	394					190	317	289	338					
8	152	180	167	140					percentages from 162								
$n = 233$	652	773	717	601					395	568	475	475					

School E, grade 5	7	30	15	7	8	9	20	24				
$n = 63$												
6	22	44	29	10	25	23	34	40				
$n = 81$												
7					40	45	41	51	18	29	31	24
$n = 77$					519	584	531	662	234	377	403	312
8	37	54	36	26	36	37	41	50	20	39	33	22
$n = 69$	536	783	522	377	522	536	594	725	290	565	478	319
Percentages for grades 5 and 6 together	181	514	306	118	229	222	375	444				
School F, grades 5 and 6 combined	30	73	31	16	26	37	32	23				
$n = 112$	265	646	274	142	230	327	283	204				
7					21	18	28	36	9	16	13	16
$n = 62$					339	290	452	581	145	258	210	258
8					32	21	26	34	22	26	21	24
$n = 58$					552	362	448	586	379	448	362	414

TABLE II—(*Continued*)

Grade	B	H	H	I	I	J	J	K	K	K	K	K	L	L	L	L
	5	2	6	2	5	3	7	1	2	5	7	8	1	2	3	6
School C, grade 7													46	180	159	182
$n = 202$													228	891	787	901
8													76	159	159	175
$n = 177$													429	898	898	989
9													46	124	129	150
$n = 178$																
10													27	51	69	68
$n = 81$																
11																
$n = 96$																
12																
$n = 94$																
School D, grade 4								169	169	114	58	40				
$n = 225$								745	745	502	255	176				
5				78	240											
$n = 293$				266	822											
6						145	150									
$n = 201$						721	746									
7													percentages from 142			
$n = 218$													169	648	584	831
8													percentages from 162			
$n = 233$													512	864	840	901

School E, grade	5	13	48	12	43	37	41								
n =	63	206	762	190	683										
	6					65	64	69	70	59	26	21			
n =	81							852	864	728	321	259			
	7					68	62	76	73	75	37	40	11	53	54	68
n =	77					883	805	987	948	974	481	519	143	688	701	883
	8					62	59	68	63	64	53	29	23	58	46	64
n =	69					899	855	986	913	928	768	420	333	841	667	928
School F, grades 5 and 6 combined				22	80	68	71	75	71	73	21	18				
n =	113			195	708	602	628	664	628	646	186	159				
	7					44	46	55	50	49	19	18	8	32	37	50
n =	62					710	742	887	806	790	306	290				
	8					46	49	53	50	50	30	20	10	41	33	59
n =	58					793	845	914	862	862	517	345				

Grade 5 of School F, with 75 pupils, gave 13 correct for H 2 and 51 for H 6. For Dif. 7, 1, 2, 3, and 4, the numbers correct were 38, 36, 42, and 39.

The Extension of Scale Alpha 2 by Sets of Difficulty 9 to 10⅓

Much time has been spent in extending Scale Alpha 2 to include difficulties greater than 9 and other samples of difficulty from 8½ to 10½, but the results to date are somewhat meager. As the difficulty increases, the chance for vagueness, long answers and other features that hamper scoring increases, unless one makes up rather unnatural passages and questions thereon.

The extensions reported here have the merit of being genuine reading tasks such as a student in high school or college, or a reader of magazines and books for adults, would encounter. Also, the questions on them, though sometimes worded in an intricate way, are not unfairly obscure. Although the scoring cannot be made automatic, or be done in a trustworthy way save by a person of fair education and judgment, it can be done very rapidly by a competent person.

The extensions reported here are evaluated only approximately; and the values calculated here from the use of sets containing other questions than those of the scale may need serious modification when the sets are used in the new form. However, these values are the product of many tests and can best be improved by making them public and so enabling others to revise them in the light of further tests.

The paragraphs and questions are as follows:

The value of each element according to the general scheme of Scale Alpha 2 is as given below. It will be remembered that by this scheme of values that difficulty which caused half of the 8th-grade pupils in schools C and D to fail is arbitrarily taken to be 8.92, and that difficulty which causes half of the 4th-grade pupils in school D to fail is arbitrarily taken to be 6.06. 5.06, and 7.92 or 4.06 and 6.92 or 7.06 and 9.92 could all be defended, decision depending on how many times as far from "just not any ability to read" the 8th grade is than the 4th.

Difficulty 9,	Element	1	8.60
		2	8.95
		3	8.85
		4	Average approximately 9
		5	
		6	

Difficulty 9⅓, Element	1	9.56
	2	9.18
	3	9.30
	4	9.45
" 10, Element	1, 2, 3	Average approximately 10
" 10⅓, Element	1	9.84
	2	10.84
	3	10.41

The value of each element was first determined as so much above or below the median difficulty for college freshmen. This 'mid-freshman' difficulty was then transposed into terms of Scale Alpha 2 on the basis of results from 75 individuals who were tested with three of these new sets and also with Set M with which the pupils in School C were tested and which can therefore be put in relation to the Scale Alpha 2 system of values.

In the following pages Elements 1, 2, and 3 of Difficulty 9 will be referred to as P, 1, 2, and 3; elements 4, 5, and 6 of Difficulty 9 will be referred to as Z, 1, 3, and 4; elements 1, 2, 3, and 4 of Difficulty 9⅓ will be referred to as W, 2, 5, 6, and 7; elements 1, 2, and 3 of Difficulty 10 will be referred to as N, 3, 4, 5; elements 1, 2, and 3 of Difficulty 10⅓ will be referred to as O, 1, 2, 3.

Set M was as follows:

M

Read this and then write the answers to 1, 2, 3, 4, and 5. Read it again as often as you need to.

However certain it may seem to be that men work only because they must, and would avoid labor except for the food, clothing and luxuries that are its rewards, the facts may well be to the contrary. It can hardly be the case that men dislike work because they wish to be utterly idle. For mere rest, mere inactivity, is not commonly enjoyed. To have nothing to do is not what men seek. Were that so, we should envy

the prisoner shut up in his cell. If men had to choose between a life spent at eight hours of work daily in a factory and a life spent at eight hours of sitting on a throne without moving hand or foot, many of them would, after trying both, choose the former. Activity of body or mind, at which a man can succeed, is, in and of itself, rather enjoyed than disliked.

1. What is it that this paragraph says may seem sure, but probably is false?

2. In what respect is a prisoner in his cell like a man with a million dollars?

3. If the absence of any activity were what we wished for, what would be our attitude toward a prisoner in his cell?

4. What is stated in the paragraph to be really liked and not objected to?

5. What choice is described in the paragraph as an argument that work, merely as such, is not always avoided?

The difficulty of Set P, 1, 2, 3 is measured by the fact that of 305 college students (255 being freshmen and 50 being a mixed class of ability in reading substantially the same as that of the 255 freshmen), 81.3 per cent answered question 1 correctly, 74.4 per cent answered question 2 correctly, and 76.4 per cent answered question 3 correctly. These three elements are thus 1.32, .97 and 1.07 below mid-freshman difficulty, averaging 1.12 below.

The difficulty of Set W, 2, 5, 6, 7 is measured by the fact that 171 college freshmen whose percentages correct for Set P, 1, 2, 3 were 79.5, 76.4, and 73.3 (averaging 76.4) had percentages correct in Set W, 2, 5, 6, 7 of 63.7, 65.7, 64.3 and 59.6. Its four elements are thus .57, .65, .59, and .41 below the mid-freshman difficulty (.52, .60, .54, and .36 less than the mid-difficulty for these 171 students). A similar calculation in the

case of a second group (35 students) gives values of .49 more than, and 1.10, .72 and .72 less than, the mid-freshman difficulty.

Weighting the former determination as 4 and the latter as 1, we have .36, .74, .62 and .47 less than the mid-freshman difficulty as a rough approximation to the difficulty of the elements W 2, W 5, W 6, and W 7.

As a very hard set we have Set O, 1, 2, 3. These are not very satisfactory as the questions are not equally hard and the variety of answers to some of the questions makes scoring difficult. They are, however, probably better than will be available without much further experimentation, and are very much better than nothing.

The difficulty of Set O is measured by the fact that for 303 of the group of 305 described above the percentages correct were in order 52, 26.7, and 37, equivalent to .075 P.E. less than the mid-freshman difficulty, .92 P.E. more than it and .49 P.E. more than it, respectively, or on the average .45 P.E. more than it.

The difficulty of Set Z, 1, 3, 4 is measured (though only very roughly) by the fact that 35 college freshmen whose percentages correct for Set P, 1, 2, 3 were 88.6, 74.3 and 80.0 (averaging 81.0) had percentages correct of 74.3, 71.4 and 88.6 (averaging 78.1) with Set Z, 1, 3, 4. Set Z, 1, 3, 4 may therefore provisionally be regarded as about .2 harder than Set P, 1, 2, 3, or as .92 P.E. less than the mid-freshman difficulty.

The difficulty of Set N, 3, 4, 5, as regards the second and third question, is measured by the fact that 110 individuals who had on the average percentages correct of 79.1 for Set P, 1, 2, 3, and who were therefore a trifle above the mid-freshman ability, had 44.5 and 55.5 per cent correct for questions 4 and 5, respectively. The difficulty of these latter seems thus in so far forth to be a trifle greater than mid-freshman difficulty. A group of sixty high-school seniors gave correct answers to questions 4 and 5 in 31.7 and 33.3 per cent of the cases.

We may then as a first approximation call the difficulty of these two questions the mid-freshman difficulty. Question 1 in its original form was harder than it now is. In that form it was apparently about .50 P.E. harder than the other two questions. In its present form changes have been made which

it is hoped will make it approximately equal in difficulty to the other two questions, though prophecies in this matter are of doubtful worth.

To turn these values in relation to the mid-freshman difficulty into terms of Scale Alpha 2, we have first to determine the difficulty of Set M, questions 1, 2, 3, 4, and 5, which serve as the connecting link.

177 pupils in grade 8 of School C showed percentages correct for Set M, questions 1, 2, 3, 4, and 5 as follows: .588, .441, .667, .113, and .333. The median difficulty for grade 8 of school C is 10.00, hence the corresponding values are 9.67, 10.22, 9.36, 11.80, and 10.64.

202 pupils in grade 7 of School C showed percentages correct of .550, .361, .535, .084, and .139. Using 9.70 as the median difficulty for grade 7, the corresponding values are 9.51, 10.23, 9.57, 11.70, and 11.31.

The median difficulty for grade 9 (first year of the high-school) was found by a study of the percentage of pupils who reached or exceeded the median for grade 8, using as a measure the combined score from a number of tests, to be 9.36. In the same way the median difficulty for grade 10 was found to be 10.06; that for grade 11 was found to be 10.50; that for grade 12 was found to be 11.22.

178 pupils in the first year of high school showed percentages correct of .348, .180, .624, .174, and .483. Using 9.36 as the median difficulty for this group, the corresponding values for M 1, M 2, M 4, and M 5 are 9.94, 10.72, 8.59, 10.75, and 9.42.

81 pupils in the second year of high school gave, as percentages correct, .679, .259, .716, .321 and 691. Using 10.06 as the median difficulty for this group, the values are 9.37, 11.02, 9.21, 10.75, and 9.32.

96 pupils in the third year of high school gave, as percentages correct, .438, .146, .500, .281, and .625. Using 10.50 as the median difficulty for this group, the values are 10.73, 12.06, 10.50, 11.36, and 10.03.

94 pupils in the fourth year of high school gave .543, .117, .702, .351, and .702 as percentages correct. Using 11.22 as the median difficulty for this group the values are 11.06, 12.98, 10.43, 11.79, and 10.43.

The percentages correct for elements L 4, L 5, L 7, L 8, M 1, M 2, M 3, M 4, and M 5 for grade 8 of School C were, in order:

L				M				
4	5	7	8	1	2	3	4	5
.689	.576	.458	.503	.588	.441	.667	.113	.333

The relations of M 1 to L 4, L 5, L 7, and L 8 are found to be —.40, +.05, +.49, and +.32. Since L 4, L 5, L 7, and L 8 are, respectively, 9.89, 9.44, 9.90, and 9.84, the corresponding values for M 1 are 10.29, 9.39, 9.41, and 9.52, averaging 9.65. The relations of M 2 to L 4, L 5, L 7, and L 8 are: —.95, —.50, —.06, and —.32, the corresponding values being 10.84, 9.94, 9.96, and 10.07, averaging 10.20. In a similar way we get averages of 9.34 for M 3, 11.78 for M 4, and 10.62 for M 5.

The percentages correct for grade 7 of School C were

L				M				
4	5	7	8	1	2	3	4	5
.475	.574	.416	.500	.555	.361	.535	.084	.139

Using the same method as for grade 8, we have averages of 9.53, 10.31, 9.54, 11.74 and 11.35 for M 1, M 2, M 3, M 4, and M 5.

The percentages correct in grades 9 and 10 are:

	L				M				
	4	5	7	8	1	2	3	4	5
Grade 9....	.354	.629	.483	.298	.348	.180	.624	.174	.483
Grade 10....	.420	.741	.481	.469	.679	.259	.716	.321	.691

As average estimates for M 1, M 2, M 3, M 4, and M 5 these data give:

Grade 9: 9.58, 10.90, 9.07, 10.93, 9.85
Grade 10: 8.72, 10.34, 8.56, 10.10, 8.92

Using the pupils in grades 11 and 12 of School C, and measuring the difficulty of the M elements by their relations to Difficulty 9, elements 1, 2, 3, 4, and 5, in the manner just shown, we have as estimates of their difficulty:

SCALE ALPHA 2. EXTENSION

DIFFICULTY 9

Read this paragraph and then write the answers to questions 1, 2 and, 3. Read it again if you need to.

Science is so new a thing and so far from final, it seems to the layman so hopelessly accurate and extensive, that a moralist may well feel some diffidence in trying to estimate its achievements and promises at their human worth. The morrow may bring some great revolution in science, and is sure to bring many a correction and many a surprise. Religion and art have had their day; indeed, a part of the faith they usually inspire is to believe that they have long ago revealed their secret. A critic may safely form a judgment concerning them; for even if he dissents from the orthodox opinion and ventures to hope that religion and art may assume in the future forms far nobler and more rational than any they have hitherto worn, still he must confess that art and religion have had several turns at the wheel; they have run their course through in various ages and climes with results which anybody is free to estimate if he has an open mind and sufficient interest in the subject. Science, on the contrary, which apparently cannot exist where intellectual freedom is denied, has flourished only twice in recorded times — once for some three hundred years in ancient Greece, and again for about the same period in modern Christendom. Its fruits have scarcely begun to appear; the lands it is discovering have not yet been circumnavigated, and there is no telling what its ultimate influence will be on human practice and feeling.

1. What condition is stated in the paragraph as making it impossible for science to exist?.....

.....

2. What, according to the paragraph, gives any interested and impartial student a right to draw conclusions concerning the influence of art?

.....

3. What sentence in the paragraph states that the devotee of religion often thinks that religious truth will not be increased?

.....

.....

Read this paragraph and then write the answers to questions 4, 5 and 6. Read it again if you need to.

Certain anthropologists have been led to the conclusion that the types of human culture represent an evolutionary series; that the primitive tribes of our times represent an older stage of cultural development through which the more advanced types passed in earlier periods. It is one of the essential traits of this theory that, in general, civilization has developed from simple forms to complex forms, and that extended fields of human culture have developed under more or less rationalistic impulses. Of late years we are beginning to recognize that human culture does not always develop from the simple to the complex, but that in many aspects two tendencies intercross, —one from the complex to the simple, the other from the simple to the complex. It is obvious that the history of industrial development is almost throughout that of increasing complexity. On the other hand, human activities that do not depend upon reasoning do not show a similar type of evolution. It is perhaps easiest to make this clear by the example of lan-

guage, which in many respects is one of the most important evidences of the history of human development. Primitive languages are, on the whole, complex. Minute differences in point of view are given expression by means of grammatical forms; and the grammatical categories of Latin, and still more those of modern English, seem crude when compared to the complexity of psychological or logical forms which primitive languages recognize, but which in our speech are disregarded entirely. On the whole, the development of languages seems to be such that the nicer distinctions are eliminated, although it must be acknowledged that opposite tendencies are not by any means absent.

4. In what feature is the development of man's work with tools contrasted with the development of his work with words?

.....

.....

5. What principle of development is almost universally characteristic of the history of industry for the past ten thousand years or more?

.....

.....

6. In what feature of civilization do primitive tribes seem to show greater elaborateness and delicacy of distinctions than modern Europeans?

.....

.....

DIFFICULTY 9½

Read this paragraph and then write answers to questions 1, 2, 3, and 4. Read it again if you need to.

But what does he mean by "natural liberty"? Here we come upon another of the great moulding influences of his life. His "passion for freedom" was not merely the practical outcome of a reaction against restrictive routine, but it had also a basis in theoretical speculation. A considerable part of the time he spent abroad had been passed in Paris. At that date there was a group of philosophers and reformers in France, "a few men," as Adam Smith called them, "of great learning and ingenuity," who are known by the name of the physiocrats, or adherents of the rule of nature. They, like him, were impatient with the vexatious regulations which hampered trade, to a greater extent in their own country than in England, and like him they felt an ardent sympathy for the common people, who were robbed of the "free disposal" of their "most sacred and inviolable" property, the labour of their hands, by these restrictions. They held that, if they could once remove this overgrowth of artificial regulation, they would find beneath it the simplicity of nature. And they argued that existing human institutions should be made to conform, as far as was possible, to the original simplicity of nature, when all men were equal and free. This was what was meant by "natural liberty." "All systems," writes Adam Smith, who in this was their disciple, although he was careful to point out the "capital error" of their "system" of political economy, which represented agriculture "as the sole source of the revenue and wealth of every country,"—"all systems, either of preference or of restraint, therefore, being thus completely taken away, the obvious and simple system of natural liberty establishes itself of its own accord."

1. What other basis had Adam Smith's belief in natural liberty besides his objection to the practical disadvantages of too many rules and regulations about things that men must not do?

.....

.....

2. In what belief did Adam Smith agree with the Physiocrats?.....

.....

3. Which of their doctrines did he disapprove?.....

.....

4. What features in human institutions, according to Adam Smith, stood in the way of the system of natural liberty?

.....

.....

DIFFICULTY 10

Read this paragraph and then write the answers to questions 1, 2, and 3. Read it again if you need to.

We will first discuss the question, in how far primitive man is capable of inhibiting impulses. It is an impression obtained by many travellers, and also based upon the experiences gained in our country, that primitive men of all races, and the less educated of our own races, have in common a lack of control of emotions, that they give way more readily to an impulse

than civilized man and the highly educated. I believe that this conception is based largely upon the neglect to consider the occasions on which a strong control of impulses is demanded in various forms of society. Most of the proofs for this alleged peculiarity are based on the fickleness and uncertainty of the disposition of primitive man, and on the strength of his passions aroused by seemingly trifling causes. I will say right here that the traveller or student measures the fickleness of the people by the importance which he attributes to the actions or purposes in which they do not persevere, and he weighs the impulse for outbursts of passion by his standard. Let me give an example: A traveller desirous of reaching his goal as soon as possible engages men to start at a certain time. To him time is exceedingly valuable. But what is time to primitive man, who does not feel the compulsion of completing a definite work at a definite time? While the traveller is fuming and raging over the delay, his men keep up their merry chatter and laughter, and cannot be induced to exert themselves to please their master.

1. According to the paragraph read, why do we regard a group of people who continually labor in pursuit of novelty and excitement as fickle, and regard a group of people who labor continually at hoeing corn or selling groceries as steadfast

   .....

   .....

2. According to the paragraph read, what is a defect in the assumption that, in primitive men of all races, power of control over thought, feeling and action is less than it is in modern European whites?

   .....

   .....

3. Complete this sentence: According to this paragraph, the proper way to compare the fickleness of the savage and that of the white is to compare their behavior in undertakings which

.....

.....

DIFFICULTY 10⅓

Read this paragraph and then write the answers to questions 1, 2, and 3. Read it again if you need to.

A chief characteristic of science, then, is that in supplementing given facts it supplements them by adding other facts belonging to the same sphere, and eventually discoverable by tracing the given object in its own plane through its continuous transformations. Science expands speculatively, by the aid of merely instrumental hypotheses, objects given in perception until they compose a congruous, self-supporting world, all parts of which might be observed consecutively. What a scientific hypothesis interpolates among the given facts—the atomic structure of things, for instance—might come in time under the direct fire of attention, fixed more scrupulously, longer, or with better instruments upon those facts themselves. Otherwise the hypothesis that assumed that structure would be simply false, just as a hypothesis that the interior of the earth is full of molten fire would be false, if on inspection nothing were found there but solid rock. Science does not merely prolong a habit of inference; it verifies and solves the inference by reaching the fact inferred. The contrast with myth at this point is very interesting; for in myth the facts are themselves made vehicles, and knowledge is felt to terminate in an independent existence on a higher or deeper level than

any immediate fact; and this circumstance is what makes myth impossible to verify and, except by laughter, to disprove.

1. According to the paragraph, what is the difference between the ether, the electrons or lines of electromagnetic force and angels, a sun-god or fairies, as principles of explanation?

.....

.....

2. According to the paragraph, by what sort of explanations of the facts of the world are the facts themselves made mere carriers of thought to conclusions in a realm outside that of such facts?

.....

.....

3. According to the paragraph, what are the methods and instruments by the aid of which perceived things and qualities are made the basis of a consistent independent universe?

.....

.....

A SOUNDER ECONOMIC BASIS FOR TRAINING SCHOOLS FOR NURSES*

By MARY ADELAIDE NUTTING

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The clear implication in the title of this paper is that training schools for nurses do not at present rest upon an entirely sound economic foundation. It is therefore advisable, I suppose, at the outset to try to show upon what kind of basis such schools for nurses do actually rest, and to see how it compares with that of other schools and colleges.

The ordinary school or college with which we are familiar has three main ways of securing support. These are through public funds derived from taxation, through private funds by gifts, and through fees from students. The older of our great universities were founded by public moneys; the younger, such as Johns Hopkins, Stanford, Chicago, by private benevolence. Women's colleges have almost without exception arisen through private gifts, individual or collective. Both universities and women's colleges are largely maintained by private philanthropy and all of them are perpetually seeking additional funds.

The alumnae of Smith, Vassar, Wellesley, and others, labor assiduously to gather contributions for their several colleges, either to increase existing endowments, to add new buildings, or to establish some new branch of instruction. Smith College, which just reports the admission of 1,700 students, has quite recently closed a successful campaign for a million dollars; Wellesley has in an astonishingly brief time secured a much larger sum to restore her buildings lost by her disastrous fire. Bryn Mawr has quite recently had about three quarters of a million given her by one alumna for the establishment and

*Read at the meeting of the State League for Nursing Education, New York, Oct. 19, 1915.

development of a particular line of work. Barnard has within the last week received from Jacob Schiff the splendid gift of over half a million for a new building. Within the space of two or three days recently there were announced in the daily press gifts to a few of our Eastern colleges within a comparatively small area which in the aggregate amount to over a million and a half dollars. These gifts may be devoted to the field of general education or to the support and advancement of technical or professional schools.

Our great professional schools of medicine, law, and theology, and also of applied science and art, have rejoiced in splendid gifts for buildings, for endowment, for special developments. The School of Journalism of Columbia University is a recent instance of such a foundation, given for the creation of a new form of professional training. Our schools of philanthropy are richly endowed. These, together with such institutes as Stevens, Pratt, Drexel, Carnegie, all proclaim the beneficence of many individuals who believe in the higher and specialized education and training of men and women.

I know of few things more impressive, indeed more profoundly moving, than to survey the field of education, and to note the richness of the gifts which have been there poured forth with such lavish hand in so many directions, and to perceive the ways through which men and women are striving to put into the hands of their fellows the supreme weapon of knowledge. These enormous private contributions made to education are the wonder and glory of our age.

Of the variety of institutions supported or aided by public funds our state systems of education show an interesting picture. Here we see support which reaches through the whole public school system and culminates in universities, colleges, and professional and technical schools. Looking upon it, one is inclined to believe that the need for training in almost any direction promising useful service to the community has only to be recognized to ensure it a place in the concern of the state, or to bring it definitely within the scope of state responsibility. It is of special interest to us to note the number and variety of private institutions to which the state finds itself able to lend support. The wide availability of such public funds for

the aid of already established schools giving instruction which is needed, suggests the advisability of bringing the financial condition of training schools for nurses to the attention of the educational authorities of the state.

We now come to students' fees as a source of income. In the conduct of such educational work as we have been considering in colleges and uuiversities, students' fees do not ordinarily play a large part, since usually not more than one-third of the annual expenses are met in this way. Under exceptionally able administration they may cover a slightly larger proportion, and since there seems to be a tendency toward increasing them, they may in future play a considerably larger part. But ordinarily in any genuine educational work, tuition fees go a very small way toward meeting the expense. This fact makes it clear that the students from great colleges and professional schools are in one sense receivers of charity, since what they pay for their education is far below its actual cost; and, indeed, it is this great sense of obligation, this conviction that some adequate return is due to society for benefits received, that impels the alumni from schools and colleges to such continuous efforts for the strengthening and upbuilding of these institutions.

The most casual study of these matters brings forth strikingly the cost of modern education. "Present educational demands, upon even a modest college," says Mr. Furst, Secretary of the Carnegie Foundation, "require resources of approximately a million dollars. The endowment per student in colleges like Bryn Mawr, Smith, Vassar, is $1,000; in certain colleges for men, it is $4,000 per student." Good teaching, he urges, is not only expensive, but absolutely not to be had below a certain minimum of expenditure, and financial resources constitute the fundamental problem. In other words, any institution which proposes to educate must depend upon appropriate, definite, and permanent sources of income.

In all this long list of great gifts for education, in all this imposing array of colleges and schools supported by such gifts, I am astonished to realize that no reference whatever is made anywhere to one of the most fundamentally important branches of professional education now in existence—schools for the

training of nurses. I suppose if Mr. Abraham Flexner were here he would take issue with me on the use of the word "professional" as applied to nursing in its usually accepted sense, and I hope to take up that point at some later time. But, is it not strange that search as you will from one end of the country (I had almost said the world) to the other, you will not find one single gift of any appreciable moment, not one endowment placed at the disposal of the training school for nurses for the proper conduct of its educational work. There have been in history two important gifts made for the education of nurses. Florence Nightingale gave the first in providing, a half-century ago, $200,000 for the founding of the Nightingale School at St. Thomas Hospital, London. The first training school in history was therefore established and has been maintained by an endowment. A half century later Mrs. Helen Hartley Jenkins of New York City gave the second considerable gift in endowing the Department of Nursing and Health for graduate nurses at Teachers College, Columbia University, and these two large gifts complete the list. There is literally nothing to add; so far as my knowledge goes there is no training school for nurses supported anywhere in this country by private endowment; there are none maintained by public funds, and public treasuries and private philanthropy alike seem to be innocent of any recognition of the fact that there are between thirty and forty thousand student nurses in training in the eleven hundred schools recorded, and that every one of these schools is carrying on its work with difficulty and at a disadvantage because of lack of resources.

There remains for consideration among the usual sources of income for educational institutions, tuition fees. These, in so far as training schools for nurses are concerned, may be summarily disposed of. There are four or five schools in this country charging small fees for the special instruction given in the few months of the preliminary course, and only one school charging tuition for its entire course. Thus it is clear that every one of the usual sources of income must be eliminated in the case of training schools for nurses, and some way which is not the common way of meeting the legitimate expenses of a school must be looked for. Such a way appears

to be found as one studies the relationship existing between training schools and the hospitals in which they have arisen. It is a most unusual form of relationship and nothing at all like it exists in connection with any other schools of the present day. It is universal in so far as training schools for nurses are concerned. Through this relationship the training school for nurses becomes an institution established by the hospital with one large main purpose and what we might call one subsidiary purpose in mind. The first purpose is clear-cut and imperative. The nursing work of the hospital, its most important task, must be done; the training school, through its students, will do it. The primary function of all training schools is that of carrying on the regular nursing work of the hospital; it is not anywhere the education of the nurse. That education is the subsidiary, secondary, purpose of the hospital in establishing a training school, and it follows as a matter of course that it can be carried out only in so far as is compatible with the main purpose of nursing the patients through the school.

The most casual glance at this situation would therefore show that the expense of maintaining training schools under such conditions would probably be slight, and a second glance would lead one to the conclusion that whatever it is, it is really met by the students themselves.

That their services cover the expense of instruction is formally recognized in the announcements of training schools, where it is usually explicitly stated that the services of the pupil are considered as an equivalent for tuition. The expenses of actual instruction, therefore, are met by the pupils themselves, and placing the minimum estimate upon the value of their services it is unquestionable that they pay larger tuition fees than are exacted in any college in the country.

In considering this aspect of affairs, two points must be kept in mind. One is, that pupil nurses are from the beginning given necessary tasks, which somebody would otherwise have to be paid to do. This principle is so well maintained throughout all hospital work that the staff of pupils in a hospital ward is no larger than would be needed if such a staff were composed of paid workers; pupils are preferred, indeed, because they do more work than graduate nurses will do under similar condi-

tions. Even the roughest estimate of the cost of any form of paid service to replace pupils shows that maintenance of an approximately similar number of workers would be required, and wages or salaries ranging from those of the unskilled household employee up to those of the highly skilled nurse would have to be paid. Anyone wishing to obtain a recent estimate of the value of pupil nurses' services to hospitals should study the records of the efforts made last year in California to repeal the eight-hour law required there for pupil nurses in hospitals. The additional expense and injury to the hospital of maintaining shorter hours were urged with emphasis from many such institutions, while one exceedingly indiscreet superintendent of a hospital declared that in order to live up to the law he would be obliged to increase the number of pupils 50 per cent. Further light on this matter may be had by noting the charges made by hospitals for the services of pupil nurses when on special duty with private patients.

It is entirely clear that large expenses for services, which the hospitals would have to incur under any other system whatever, are avoided by the establishment of a training school, and a very considerable sum is thus made available for the instruction and training for which the labor of pupils is asked, and is so freely given.

Not very long ago I saw a statement in some hospital or nursing journal to the effect that it cost the hospital between three and four hundred dollars a year for the education of each pupil. This, of course may be literally correct; but it is essentially incorrect, since it fails to estimate in any way the value to the hospital of the returns which the student always makes. There appears to me to be no way of getting around the actual economic value of the student's services.

Let us consider these expenses which hospitals have to meet, taking first the administration of a school. Here there can be little question of expense, because those who manage the school are in reality officers of the nursing department of the hospital who would have to be there in about the same numbers and grades to direct and supervise the nursing if there were no school and the work were done by a staff of paid workers. And, of course, there are many schools, the majority in fact, in which

most of these official positions are filled by senior pupils, thus adding another item to the contributions made by pupils to their own education.

Actual instruction comes next for consideration, and this is of two kinds: theoretical teaching in the class room; practical teaching in the wards. Here again the hospital has been released from any appreciable additional expense since the bulk of the teaching has always been done by the officers of the nursing department, in addition to their regular executive and supervising duties. Until within the last few years no training school for nurses had even one regular instructor on its staff, and the great majority of schools are still in this position. In all the larger schools of the better grade one regular instructor is now provided, and in some cases there are two. As yet, however, no considerable expense for such instruction is incurred. Lectures are still in the majority of schools given by physicians without payment, though again in the larger schools part of these lectures are paid for, and all of them are in one or two schools. As, however, the number of lectures is small, —not more than two or three a week, at the utmost,—the expense thus incurred is slight. For libraries and teaching material and equipment it can truthfully be said that few hospitals have even attempted to make respectable provision. In providing suitable housing and living conditions for students, hospitals are doing more to meet their obligations to them than in any other aspect of their work; but it is, of course, pertinent here to mention that such expense cannot be charged to the maintenance of a training school, since suitable quarters would be required equally for any kind of a staff the hospital might employ. Moreover, there are still hundreds of hospitals in which the quarters and the food provided for pupil nurses are a scandal to the community.

As for hours of work, notwithstanding some improvements, they are still a burning question, and are such as to make it very difficult and frequently impossible for pupils to take their theoretical work seriously. Yet hospitals do not find themselves able to meet the expense involved in providing the larger staff that would admit of shorter hours. One would suppose that any institution thus miraculously supplied with a body of pupils

whom it could at will translate into an entire working force, would not question the justice and wisdom of adjusting its hours of work in such a way that the educational needs of the pupils would be satisfied. Yet to-night as I read this to you, hundreds of young pupil nurses are at work on night duty in the hospitals of this city and elsewhere, and this night of work will be twelve hours long. Service of this kind will be made to occupy at least six months out of a three-years' training. Yet from any conceivable educational standpoint one month of such service would usually be ample. We were impressed, a little while ago, in reviewing briefly the field of education with its great, and apparently unavoidable, cost. The more carefully I study the work of training schools for nurses, the more I am convinced that failure to recognize this elementary fact, as applying to their conduct, is at the root of many of the troubles in the present training school situation. What seems to be needed now is a truer conception of the responsibilities which are inevitably assumed in attempting to direct, control, and develop in any adequate way this large, complicated, and most vital branch of professional education, and ability to face the situation squarely, recognizing that adequate funds are just as necessary for the proper maintenance of training schools for nurses as they are for medical, engineering, or any other professional schools. No equitable and stable adjustment can ever be made between hospital and training schools until this fact is understood, accepted, and made to bear upon the whole scheme of training.

In thinking this whole problem over I have been impressed with the fact that, though hospitals are constantly and properly making the public acquainted with their needs, I do not remember ever hearing of any instances of hospitals asking for funds for the maintenance of their training schools. Yet I can hardly imagine any branch of their work for the maintenance of which they could with better grace turn to the public. There are literally thousands of men and women who owe their health or their lives to the skill, knowledge, and devotion of nurses. There are those among them who have given liberally to other forms of education and would, I am confident, willingly contribute to the education of nurses were they but made aware

of the need. It is not due to any lack of appreciation of the valuable and indeed indispensable services which nurses are rendering to society that they have not tried to help forward their education and training, but to a prevalent impression that this is wholly the business of hospitals, which are quite able to do all that is necessary. There is much need of a really correct understanding of what hospitals can and cannot do. They cannot, for instance, on funds which are seldom if ever sufficient for actual hospital needs, maintain training schools as they should be maintained. They cannot unaided carry forward the important educational work which has been entrusted to them.

From some source, either from private gifts for endowment, from public funds for maintenance, or even partly from tuition fees (under different conditions of service), training schools should be able to command adequate funds. These should be based upon an intelligent and unprejudiced estimate of the work the school ought to do and the way in which it ought to meet growing and changing public demands.

I have been asked what an endowment could do for a training school. It might do any or all of the following things:

It might provide for trained and expert lecturers and teachers to give appropriate and sufficient instruction in all of the necessary and desirable subjects, and this would apply to practical instruction at the bed-side as well as to theory in the class room.

It might provide suitably for such teaching equipment and material as is commonly found in all schools having any scientific or technical subjects to handle.

It might provide students' buildings which would have libraries, both professional and general, lecture rooms and class rooms, and laboratories and offices, in addition to suitable living and recreation rooms. Cheerful surroundings and a chance for wholesome diversions are particularly desirable for those whose work lies entirely among the sick. These it might do directly, and indirectly it might aid in securing for students shorter hours both for day and night work, and proper vacations and holidays. For the hospital openly relieved from any expense whatever in connection with the training school could turn its attention and its funds to the provision of a regular

salaried staff of nurses and other workers for much of the routine work now done by students. This, in increasing the number of workers, would logically bring about the shorter hours. And these, in connection with improvements in the amount and character of instruction, would attract the higher and better grade of candidate which is so urgently needed. Such measures have done this in every instance where they have been established and steadily and intelligently applied.

I firmly believe that generous financial help would flow into our training schools from private sources were the need fully recognized, and I see no reason why schools rendering an important public service should not also secure substantial aid from public funds. The problem of the poor, ill-equipped training school connected with the struggling hospital in the small community might in a measure be solved through such aid. From whatever source funds may come, they are necessary to place schools on a secure and dignified foundation, and to release them from their present helpless and somewhat ignominious position, due largely to an entirely unsound economic status.

This paper merely touches the subject, which needs, and doubtless will get, careful and searching inquiry. But in the meantime those nurses who are genuinely interested in improving their own profession can do so in no more effective way than by helping their training schools up to a higher and freer plane of work. Already the alumnae of the Johns Hopkins Training School, and the Massachusetts General, have taken up the question of the endowments of their schools, and committees are being formed to consider ways and means.

Nurses may with courage and confidence take up this question of proper support for their training schools, since in the last analysis it is the concern, and the grave concern, of the whole community. The public cannot longer leave entirely to hospitals, or to the labors of pupil-nurses, the maintenance of so essential a branch of modern education.

Let me repeat. There have been in history but two large gifts for the education of nurses. The first, by Florence Nightingale, created the whole modern system of training schools and of nursing; the second, by Mrs. Helen Hartley Jenkins, has

established firmly in a great university a department for the special professional training of graduate nurses, and has made possible the opening up of some entirely new lines of work, such, for instance as education for public health nursing and training for public school work. The next great service to be rendered is to place training schools upon a better and sounder economic foundation.

COLLEGE NEWS AND DEPARTMENTAL NOTES

REORGANIZATION OF INDUSTRIAL ARTS DEPARTMENT

In order to meet the large demand to-day for supervisors and directors of vocational and industrial education, the trustees of Teachers College have just announced a reorganization of the department of industrial arts, in order that the College may have adequate facilities for preparing this new type of leader. On beginning the new work, two of the shops which have been devoted exclusively to advanced technical courses will be discontinued, since their function in the past has been mainly that of giving students the advanced skill in woodwork and metalwork demanded of those who will teach in trade schools or technical high schools.

With the largest enrollment in industrial arts in the history of the College, the proportion of students requiring this advanced shop work is the smallest. The shop work of these students has been done in other schools or in trade shops before coming to the College. In most instances these students come to the College on advanced standing from other technical and manual training colleges and not directly from the high school. Further, opportunities in shop work, so few in number in the earlier years of the College, are now available in almost every part of the country. Positions to teach in vocational or trade schools requiring a high technical skill, without administrative ability, are being filled by men of at least journeyman standing in their respective trades. It is no longer necessary, therefore, for Teachers College to continue the advanced technical instruction in these fields.

The College will, however, continue those shops and labora-

tories necessary for training teachers in industrial arts for the elementary school and for the junior high school. In fact, facilities in this direction will be more adequate than heretofore. New courses will be offered, in which emphasis will be given to a selection of work appropriate for the seventh to the tenth grades of the public school system, whatever form of organization these years may take.

On the advanced side the main interest will be a considerably further development of facilities for preparing supervisors and directors of vocational and industrial education. Already the College has a number of men preparing for this kind of work, due to its large facilities for giving training in the advanced phases of educational administration and organization. These men, coming to the College already equipped with shop skill and teaching experience, devote their time here to advanced courses which lead to the degree of Bachelor of Science or Master of Arts. The demand upon the College for men prepared for this supervisory work is far greater than it has been able to supply. The new courses to be offered will include both the organization and administration of vocational and industrial education.

This reorganization is in harmony with the policy of the College to discontinue any lines of work in which it was once a pioneer but which is now being done well in many institutions throughout the country, and to reserve its resources and facilities in order that it may offer a kind of advanced training which has not been developed elsewhere. Such a change is not a new policy of the College. Several years ago in its School of Education it gave up the freshman and sophomore years of the four-year course. A year and a half ago it discontinued the junior and senior years of the same course, making the School of Education exclusively a graduate school. In each instance this was done because there were adequate facilities in other colleges for getting the courses that were discontinued, and because there was a demand for a more advanced type of work, especially along administrative and supervisory lines, which was not being offered elsewhere. As a result of these changes the registration in the School of Education has doubled in two years.

NEW SPEYER SCHOOL EXPERIMENT

An educational experiment that promises to have far reaching results is to be undertaken February 1st by the Board of Education of the City of New York in coöperation with Teachers College. The main feature of the experiment is to ascertain what abbreviation of the course of study during the last two years of the elementary school and the first year of the high school can be effected in the public schools of New York. This is to be accomplished partly by modification of the curriculum and by improved methods of instruction, but chiefly by adapting the rate of progress to the ability of homogeneous groups of pupils. The experiment will start in the Speyer School of Teachers College with two hundred more or less accelerant boys who have completed the sixth year in the New York schools, and who by the declaration of their parents intend to prepare for college. A similar experiment will be carried on in two other schools, one in Manhattan and one in Brooklyn. At the beginning work will be provided only for the seventh school year. The second year will, it is hoped, so prepare some of these boys that they may the following year enter the sophomore class of the regular high schools in the city, thereby doing three years' work in two. Results will be carefully measured.

Realizing as Superintendent Maxwell does that there are in the public schools of the city to-day several thousand boys of the particular type that this experiment is intended to reach, no exertion will be spared to make the school a success.

The course of study will be based upon that now in operation in the city and will be organized along the lines of the junior high school. The curriculum includes mathematics, English, Latin, history, general science, physical education, fine arts, music, and industrial arts. It is expected that later in the experiment various methods of teaching the same subject will be employed in different groups and the results measured with a view to determining the most effective means of instruction in the subjects offered and the practicability of gaining a school year for especially gifted pupils.

The teaching force will be selected from two sources: those

who are now actively engaged in teaching and hold licenses for the seventh or eighth grades of the New York City schools, and instructors and advanced students at Teachers College; the academic subjects (except general science) to be taught by the first group and the remaining subjects by the Teachers College group.

The school will have as its principal Mr. C. B. Jameson, principal of Public School No. 43, New York City. Professor Thomas H. Briggs of Teachers College will coöperate with Principal Jameson as educational advisor and will have an office at the school. There will be facilities for observation and coöperation in the instruction on the part of the officers and students of Teachers College.

On the administrative side, Teachers College offers the Speyer School building with its complete furnishings to the City of New York, free of rent, for a term of three years; the city to maintain the building and make repairs, pay the teaching force (except such as come from Teachers College), and provide janitor service.

Provision for girls will also be made at the Speyer School, but only for instruction in sewing and cooking. The girls of the seventh and eighth grades of Public School No. 43 will come to the laboratories of the school for this work, which will be given by students and instructors of the department of household arts of the College. Twenty-seven classes in all are provided for, each eighty minutes in length, to be given during the regular school hours from nine to three o'clock. The girls will receive instruction in all other subjects at Public School No. 43.

Commencing February 1st, another interesting experiment is to be carried on, also at the Speyer School. Twelve girls of the Hebrew Orphanage, at Amsterdam Avenue and 139th Street, will occupy the model apartment on the top floor of the school. with Miss De Pinna, of the department of household administration of Teachers College, as house mother. These girls will make the apartment their exclusive home for a period of two months, when they will be succeeded by another similar group. The object of this experiment is to give these girls the experience of living in a home, their previous life having been almost

entirely institutional. The girls range in age from fourteen to eighteen years, and are students in one of the city high schools. It is planned to have them plan and prepare their own meals, care for the apartment, buy their food and clothing, and do simple laundering, all in addition to their regular school work. There will also be visits to museums, shopping trips, and social parties conducted in the apartment. Under the direction of the department of household arts of Teachers College these girls will receive instruction three afternoons a week in cooking, nutrition, sewing, laundering, and household management. The experiment is being carried on by the Hebrew Orphanage with the coöperation of Teachers College.

DEATH OF PROFESSOR MacVANNEL

On November 10, 1915, Dr. John Angus MacVannel, professor of the philosophy of education in Teachers College, died in his forty-fifth year at his home in St. Mary's, Ontario. He left a widow and one child, a daughter of about seven years of age. His death was not altogether unexpected. For some time chronic Brights disease had made inroads upon his bodily strength. His circulatory system had become involved, causing hardening of the arteries and consequent slight paralytic strokes which still further impaired his vigor. For the past two years he had not been able to carry full work; for this scholastic year he had not returned at all to the classroom. When finally the end came, it was tranquil; although he expressed disappointment that he might not die in the new home which he and his wife were building at St. Mary's for his declining years.

A Canadian by birth and rearing, Professor MacVannel received his college education at the University of Toronto, receiving the degree of Bachelor of Arts in 1893 and the degree of Master of Arts a year later. Here he followed the bent of his Scotch ancestry and specialized in philosophy, being probably more attracted to ethics than to metaphysics. To follow the leading of this interest he came to Columbia and studied philosophy and education under Professor (now President) Nicholas Murray Butler. In 1898 he received the degree of Doctor of Philosophy from Columbia, his dissertation being on

"Hegel's Doctrine of the Will." While a graduate student he also served as assistant in philosophy and education from 1896 to 1898. For the years 1898-01, he taught education in Pratt Institute, Brooklyn, returning to Columbia as lecturer in philosophy in 1901-02. The following year—upon the appointment of Professor Butler to the presidency of the university—Dr. MacVannel was made instructor in the philosophy of education in Teachers College. In 1904 he was made associate professor, and in 1906 was promoted to a full professorship, which he held till his death. In the emergency created by the sudden illness and death of Professor Mary D. Runyan in June, 1905, Professor MacVannel served also for several years as head of the department of kindergarten education.

In addition to his dissertation Professor MacVannel wrote "The Educational Theories of Herbart and Froebel" (1905) and an "Outline of a Course in the Philosophy of Education" (1912). The former grew out of his course on the Educational Theories of Herbart and Froebel which so many will remember with pleasure. The latter similarly grew out of the syllabus made for his practicum in the philosophy of education. When this was published, he had already begun to decline in health. He had originally planned a treatise on the subject, but as his strength did not suffice for the completion of this, he modestly called it an "Outline of a Course." The student who masters it, will find, however, that it embodies an inclusive philosophy of education, expressed though it often is only in outline form.

Professor MacVannel's philosophy is not easily stated, both because he left us no adequate account of it, and because his classroom work was never mere lecture. He drew out from the students the adequacies and inadequacies of their positions; he never stated dogmatically his own. It seems reasonably certain that he felt most satisfied with the neo-Hegelianism of Green and the Cairds. Yet he was a great admirer of Professor Dewey, and used in no small degree the functional psychology. As intimated above he was most of all ethically minded, with even a trace of the mystic, and it need not be doubted that he was drawn to the neo-Hegelian school because the teleology of that position seemed to him to afford the most satisfactory basis for ethics.

In the management of his classroom Professor MacVannel was in marked contrast with not a few of his more practically minded colleagues. The fundamental upon which he based his method was the need that the individual student work out his own philosophy. To this end the hour spent with him was devoted to discussion. The topic had been announced at the preceding hour with some general suggestions in the syllabus for appropriate reading. Some student would be called upon to state his position. Professor MacVannel would then question in Socratic vein until the student had tangled himself or had provoked another student to try what better he could do. In a very indirect way Professor MacVannel would lead the discussion back and forth until the ground had been covered, his own ideas being given meanwhile so incidentally that an unobservant student might be quite unaware of the contribution thus made to the discussion. The effect of this was, as might be expected, differently rated. Some students complained that garrulous fellow-students wasted the time of the class. Others said openly that Professor MacVannel's class meant more to them than any other of the College. On one point there was no diversity of opinion: all felt by the very presence of Professor MacVannel that he was one of the kindliest and gentlest of men, a soul that radiated what he was. He was universally loved by both his colleagues and his students.

TRABUE'S DISSERTATION ON COMPLETION TESTS

Many of the tests upon which psychologists depend for their knowledge of an individual's mental characteristics are of such a nature that it is almost impossible to make extended use of them in the schoolroom. There are other very reliable psychological tests, however, which may be adapted to schoolroom use with comparatively few changes. One of these is the completion test, which psychologists have come to regard as an unusually good test of ability to think about words and language forms. In view of the fact that so much of the child's school work is dependent upon his ability to read and interpret printed words, it has seemed worth while to Dr. M. R. Trabue

of Teachers College to make such changes in the form of the completion test as will make it available for general use in schools. The complete results of Dr. Trabue's study are found in his Doctor's dissertation[1] which is now in press. A short review of this important investigation will be of interest.

The completion tests devised by Dr. Trabue consist of mutilated sentences, i.e., sentences in which one or more words have been omitted. A specimen of such test is given below. In giving the tests it is required that pupils complete the sentences by supplying the missing words, this procedure having given to the test the name "completion" test.

Write only one word on each blank
Time limit: Seven minutes

LANGUAGE SCALE B

1. We like good boys ..... girls. (*Value 0.9*)

6. The ..... is barking at the cat. (*Value 2.0*)

8. The stars and the ..... will shine tonight. (*Value 2.9*)

22. Time ..... often more valuable ..... money. (*Value 4.3*)

23. The poor baby ..... as if it were ..... sick. (*Value 5.4*)

31. She ..... if she will. (*Value 6.5*)

35. Brothers and sisters ..... always ..... to help ..... other and should ..... quarrel. (*Value 7.4*)

38. ..... weather usually ..... a good effect ..... one's spirits. (*Value 8.4*)

[1] M. R. Trabue: Completion-Test Language Scales. Teachers College Contributions to Education, No. 77, 1916, Bureau of Publications, Teachers College.

48. It is very annoying to .... tooth-ache, ... often comes at the most ..... time imaginable. (*Value 9.5*)

54. To ..... friends is always ..... the ..... it takes. (*Value 10.8*)

The values given above in italics indicate the relative difficulty of each sentence.

Professor Ebbinghaus, who was the first to employ the completion-test method, used mutilated paragraphs instead of sentences. He described the test as "an easily and quickly applied test of those powers which make for success in school and in life." Paragraph tests, however, are of service chiefly in testing adults, and are too difficult for use with elementary school pupils. Dr. Trabue has found it possible to begin a test with sentences so simple that a large majority of the second-grade pupils are able to complete them correctly, and to finish the test with sentences so difficult that only a small percentage of the freshmen in college complete them.

A second difficulty with previous paragraph completion-test forms arises from the fact that we do not know the relative values of the various commonly used paragraphs, which makes it practically impossible to measure progress from year to year or from grade to grade. This objection has been met by Dr. Trabue by actually trying the incomplete sentences upon thousands of public-school children and discovering from the results just how difficult each sentence is for each class of children, and for all children together. From the results thus obtained, four approximately equal scales[1] have been derived (Scale B, shown above, being one of the four), each scale consisting of ten sentences, which are arranged in the order of their difficulty from simple to hard. By measuring ability at the beginning of a year with one scale and then at the beginning of the next year with an equivalent scale, it is possible by

[1] Dr. Trabue's Language Scales are issued separately, in 8 sheets, in a form suitable for use with pupils. They are published by the Bureau of Publications of Teachers College.

subtracting the first result from the second to determine the amount of progress made by a class or by a child during a year.

A third difficulty with the paragraph form of the completion test is found in the scoring. Ebbinghaus scored according to the number of syllables correctly supplied, but this method is inadequate, for some syllables are ten times as hard to supply as others. Later investigators have estimated the quality of the completed paragraphs as wholes, giving 100 per cent for a perfectly completed paragraph, 50 per cent "if the inserted words make a well-connected story, but are related in only a moderate degree to the thought that should have been given," and no credit at all for words which are "purely literary invention, having no connection with the thought given by the printed words." It will readily be seen that very careful consideration and judgment are required if one is to assign accurate and comparable scores in the foregoing manner. Even trained psychologists have difficulty in agreeing just how much a given completion is worth. Teachers and school administrators are usually too busy with other school problems to spend much time in such tiresome mental labor as is required to assign scores to partially completed paragraphs.

After making an attempt to distinguish six grades of quality (5-4-3-2-1-0) in the completion of a sentence,[1] Dr. Trabue found that practically nothing was lost by simplifying the scoring still further, giving 2 points credit for each perfectly completed sentence, 1 point for each sentence completed with only a slight imperfection, and 0 for any sentence omitted or imperfectly completed. It is infinitely easier and quicker to say that a sentence is "right," or that it is almost "right," than it is to decide that a partially completed paragraph is worth 78 per cent or 39 per cent of a perfectly completed paragraph. Dr. Trabue has also published in the Appendix of his report the detailed scheme by which each individual sentence was scored, in order that teachers or administrators who do not wish to be bothered with the making of judgments as to whether a sentence is right or wrong may have before them

[1] J. L. Stenquist, E. L. Thorndike, and M. R. Trabue: The Intellectual Status of Children Who are Public Charges, *Archives of Psychology*, No. 33, September, 1915, pp. 13-19.

very objectively just what has been called "right" and what has been called "wrong."

Dr. Trabue is rather firmly convinced that ability to perform mental tasks can be measured more adequately by a graded series of performances to be done in a given time than by any other scheme. The measurement of physical ability to lift weights at arm's length may be taken as an analogy. If we had a series of ten weights, ranging from 20 to 200 pounds by steps of 20 pounds between consecutive weights, we might measure a boy's ability by having him begin at the lightest of the series and at arm's length lift in their order to the level of his shoulder as many of the weights as possible. In order to make the analogy with Scale B complete, we should have to give 2 points credit for each weight lifted to a level with his shoulders, and 1 point for each weight which was lifted "almost but not quite" to the shoulder level within a time-limit of seven minutes. With the older completion-test forms the analogous measurement would be as follows: give the individual the 200-pound weight and see how nearly to the shoulder level he can raise it in ten minutes. It is clear at once that a test arranged on such a plan could be used for only a short fraction of the total range of ability, and that scores assigned by different individuals for the same quality of performance would vary considerably.

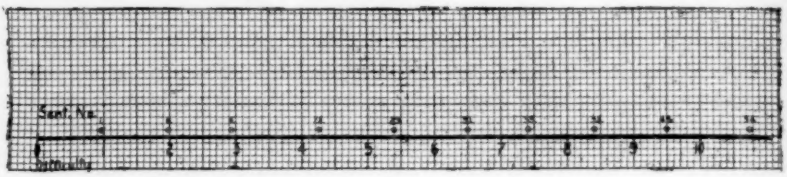
With certain commonly used tests in arithmetic the analogous measurement would be somewhat as follows: give the boy a large number of 100-pound weights and see how many of them he can at arm's length lift to shoulder level in four minutes. It is evident at once that a large amount of ability must be present before such a test can begin to measure, and that speed is practically the only element of ability measured. In so far as speed is desirable, however, it is highly worth while to measure it, although we must be careful not to take a measurement of speed as a sufficient index of ability.

In arranging the language scales, Dr. Trabue has assumed that older children will not only be able to do the same tasks more rapidly and more perfectly than younger children, but that the older children will also be able to accomplish perfectly tasks which the younger children could not begin to

do. The results from twelve or thirteen thousand children, upon whom these sentences have been tried, seem to support this assumption in every respect.

The unit of difficulty used in this study was a measure of the variability of a school grade group, the assumption being made that one such group is as variable as any other similar group and that each such group is distributed according to the normal surface of frequency. The difference in difficulty between any two consecutive sentences in Language Scale B might be roughly described as such that in any given grade group, if exactly 50 per cent of the pupils are able to complete a certain sentence, then 25 per cent of that group will be able to complete the next harder sentence and 75 per cent of the group will be able to complete the next easier sentence.

A graphic representation of the location on the scale-for-difficulty of each sentence of Scale B is shown below.



Each sentence is represented by a point in a circle above the line, while the scale for difficulty is shown below the line. The figures above each point indicate the reference number of the sentence represented by the point.

Dr. Trabue's completion tests will prove of much value to public school teachers as measures of the progress of children in language, and to students of vocational and educational guidance as instruments for the classification of those whom they seek to guide.

The completion test is not proposed as a substitute for the judgment of teachers in promoting pupils, but rather as an aid to it. Employing one of these scales will call attention to those children who have unusual ability to understand and interpret printed words and phrases. These unusual cases may then be investigated more carefully and such readjustments

made as will allow these children to work under the most favorable conditions.

DIPLOMA FOR DEAN OF WOMEN

Among the four hundred women taking advanced courses in the School of Education, leading to the degree of Master of Arts, are twenty-six who are preparing to be deans of women in colleges or normal schools. The demand from women with educational experience for preparation in this new field of work has been so great that the College authorities have recently provided for the first time courses aiming to give women the specialized training necessary to perform adequately the functions of a dean.

Among the courses taken by those who are studying in this new field are the education of women, history of the family, educational sociology, problems in administrative work, religious education, hygiene, sex education, educational psychology, philosophy of education, economics, and social usage. The program varies for each student and is made up under the guidance of a faculty advisor who studies carefully the needs presented. Nearly all the women enrolled in this work are here on leave of absence from administrative positions. They bring with them definite problems for which they are seeking solutions.

The College has also established in connection with this work a new diploma for dean of women which will be granted to candidates for the Master's degree who complete the course with a high grade of scholarship, who possess the personal qualifications necessary for success in this field, and who have a record of satisfactory previous administrative experience. It is planned further to increase the facilities for preparation in this new work in the near future.

HOUSEHOLD ADMINISTRATION

The students in household and institution administration were given an excellent talk recently by Miss Sara Louise Arnold, dean of Simmons College, Boston. Miss Arnold used

as her theme for the hour's talk "Spending One's Time," and gave much which was a real inspiration to all in the group.

A new course is being given this year by Professor Gunther, entitled Principles of Administration. This course aims to present to students some of the various fields of work open to women to-day, laying special emphasis on those fields related to household problems, and also on those connected with institution administration. Each field of work, like that of the dietitian, college dormitory director, lunchroom manager, visiting housekeeper, settlement head, etc., is presented in such a way as to give students an idea of the nature and scope of the work, something of the qualifications of such an administrator, training necessary, remuneration, with sufficient references and experiences from those in the field to make a student somewhat conversant with that kind of work. As far as possible workers in the various fields are invited to speak to the group, thus giving first-hand knowledge in every case. It has seemed very necessary to have some such course as this because large numbers of students enter the four years of the Practical Arts course with no definite knowledge of what is possible to-day in the various fields of work.

The extension short courses on "Home Problems for Mothers and Home-Keepers," which started in November, are being attended by an enthusiastic group of fifty women, many of whom are members of the Horace Mann Mothers' Club.

THE SECONDARY CLUB

In October the Secondary Club reorganized with plenty of enthusiasm and with the expectation of making this a notable year in its history. So far it seems justified in its expectation. Three meetings have already been held and the interest which they have aroused has raised the membership to more than one hundred and fifty. The program each month consists of an address as its principal feature, followed by music and other provision for "the social nature of the individual."

The opening meeting of the club occurred on October 28 with Dean Russell as the speaker. His very interesting talk on "The Present Outlook for American Education" was fol-

lowed by several songs by Mr. Albert Wiederhold. The business of the evening was the election of officers, resulting in the choice of Mr. W. L. Spencer for president, Miss Elizabeth D. Young for vice-president, Miss May Hamilton for secretary, and Mr. A. L. Terrell for treasurer.

At the second meeting, on November 22, Mr. Thomas Alexander, who has made an intimate study of the German educational system for his doctor's dissertation, talked on the subject of "German Secondary Schools." Dr. Kilpatrick led the discussion which followed and Mr. Thomas Safford of Old St. George's contributed the musical portion of the program.

The last meeting, on December 15, was the Christmas party of the club. Dr. T. H. Briggs, who is a member of the N. E. A. Committee on Secondary Education, chose as his subject "Reorganizing Secondary Education." The address was a report of the proceedings of the committee at its meeting in Chicago in November and proved of great interest to all present. Miss Koch's songs added much to the enjoyment of the evening. In the games which followed everyone forgot grown-up dignity and entered into a frolic that did a great deal to promote a real feeling of good fellowship among the members of the club.

The plans for the remainder of the year include an address in January by Professor Erskine of Columbia, one in February by Professor Cubberley of Leland Stanford Junior University, and one in April by President Butler. The club feels that it has every reason to congratulate itself both upon the speakers already heard and those in prospect.

WOMEN'S DISCUSSION CLUB

The luncheon meetings of the Women's Discussion Club have afforded much food for mind as well as body. At the last meeting, to which the men of the College were invited, Professor Briggs spoke on secondary education. Speakers at the previous noon meetings have been Professor Goodsell on vocational *vs.* liberal education and Professor Hill on the advance in kindergarten methods in the last ten years.

The alternate weekly discussions of club members have been

fruitful also. Miss Hartle of Cambridge, England, explained training colleges in England; Miss Bessie Goodrich outlined her work as superintendent of teachers in Michigan, and Miss M. F. Warren told how incorrigible boys could like geography. Those of its members who are planning to attend the Department of Superintendence meeting in Detroit in February may enjoy a reunion by sending their names at once to Miss Frances Jenkins, instructor in elementary education, University of Cincinnati.

SHAKESPEARE EXHIBIT

A Shakespeare exhibit has been arranged to be given at the College the week of the Alumni Reunion. Many of its features will be of exceptional educational interest. Various departments of the College will exhibit material characteristic of Shakespeare and his age. The dining room of the foods and cookery departments will be decorated and arranged to represent an Elizabethan banquet-hall, and members of that department, appropriately costumed, will keep open house, and offer their friends Elizabethan cheer. Throughout the Household Arts Building will be pictures, utensils, and demonstrations representing the arts of the home. The industrial arts departments are planning a similar exhibit; the fine arts department is making designs for textiles, furniture, and other objects based on Elizabethan motifs. The costume of the period will be abundantly illustrated not only in the Festival, but also in prompt-books and sketches for plays, and in other ways. Amateur production of the plays in schools and colleges will be illustrated by a collection of prompt-books and of stage and costume sketches or photographs; the teaching of Shakespeare, by an exhibit of the schoolbooks studied in schools of the age, and by one illustrating the various stages through which Shakespeare teaching has gone in modern schools.

In addition to these set exhibits, most of which will remain for a week or longer, several departments have planned programs of special interest for the days of the Alumni Conferences, February 18-19. Among these, at hours to be announced, will be recitals of stories that Shakespeare may have known, or of those on which he based his plays, by students of speech;

a recital of Elizabethan music, vocal and instrumental; a lecture on Elizabethan schoolbooks; and a demonstration of a class being conducted in an Elizabethan school.

Plans for the annual Teachers College Festival, which by this third celebration has become a habit, are well under way. The festival dates will coincide with the return of the alumni on February 18-19, making possible the attendance and participation of many graduates in the evening festivities.

Shakespeare and his times will be the subject of the festival this year. For further details see p. 105.

THE 1916 YEAR BOOK

In the fall of 1912 the doors of Teachers College were thrown open to a class of students which had previously been excluded from its curricula. With the opening of the School of Practical Arts at that time a group of one hundred fifty students from accredited secondary schools entered upon their four-year course with all the enthusiasm typical of college freshmen. Many of their ideas have materialized during the last four years, and the hopes of the class will reach a climax when in May they present to the public the first Teachers College Year Book.

The staff has two objects in publishing "The Tower"; first, to present to their friends a summary of the activities and achievements during four busy years; and second, and not less important, to produce by their own editorial efforts a Teachers College publication wherein all departments, both faculty and student, will be represented. Organizations, athletics, dramatics, personals, sororities, faculty, are a few of the headings under which the college life will be portrayed. There will be pictures of the faculty and of the senior class.

The cost entailed in producing this book will be about $1,500. Of this amount $1,000 will find its way into the printer's office, while the engraver will receive $300. The balance, $200, is allowed for incidental expenses. There will be two editions, one at $1 and one at $3. As it will be absolutely impossible for the editorial staff or the whole class to raise this fund without the coöperation of the student body, alumni, and friends,

an earnest plea is made for help in securing advertisements, subscriptions, and interest in this last contribution of the class of 1916—a year book worthy of the ideals and standards which have placed Teachers College high in the educational world. Copies of the year book may be ordered by addressing the president of the Class of 1916.

FEDERATION OF UNDERGRADUATE CLASSES

The federation of the undergraduates of Teachers College is now practically accomplished. Following the plan suggested at the mass meeting held last October, the several undergraduate classes of the College are now completing formalities necessary for an organization to be known as the Undergraduate Federation.

While the unity of the classes is to be preserved, the purpose of the federation is to secure harmony and coöperation among them and also to aid in the individual welfare of the students. A constitution prepared by the committee appointed last October was presented at a mass meeting held January 10, and is now being submitted to each of the undergraduate classes for final action.

With such an organization as the federation, many undergraduate activities along social and other lines will be made possible, as well as a closer unity in the work of the College. Probably one of the first acts of the federation will be to rate in terms of points each of the offices in classes, clubs, and committees, such as president, secretary, chairman, etc., and to agree that no student shall be permitted to hold offices totaling more than 100 points. Such a plan would keep students from undertaking more obligations than they ought. The federation may also arrange to give an undergraduate play.

ALUMNI ACTIVITIES

DR. BUCKINGHAM GOES TO WISCONSIN

Dr. Burdette R. Buckingham, chief statistician in the office of the superintendent of schools of New York City, has just been appointed state educational statistician for Wisconsin, a new position recently created by the Wisconsin authorities. In this new work Dr. Buckingham will be responsible to the central board of education of the state for the educational budget of state institutions which the board will submit to the legislature. This budget has particular reference to the University of Wisconsin and to the state normal schools. Supplementary to his duties as statistician Dr. Buckingham will have certain inspection duties which will take him about the state to visit the normal schools. In this latter work the inclusion of other schools, such as high and elementary, while probably not immediate, is thought to be likely before long.

The position of statistician to the city superintendent of New York, which Dr. Buckingham has just resigned, was also recently created. In this work it was his duty to devise forms for keeping records in the schools, and for reporting such information as was desired by the city superintendent. He also arranged this material for publication and report. His work included a considerable amount of investigating of the abilities of pupils in school subjects.

Dr. Buckingham graduated from Wesleyan University in 1899 with the degree of Bachelor of Arts, receiving in 1900 the degree of Master of Arts from the same institution. In 1901 he received the degree of Pd.B. from the Albany State Normal College. He was principal of schools at Northport, L. I., from 1901-4, teacher of mathematics in the Morris High School from 1904-7, and principal of an elementary school in New

York City from 1907-14, when he became chief statistician to the superintendent of schools as the result of a competitive examination given by the Municipal Civil Service Commission. During his period of work in New York City he also studied at Teachers College, receiving in 1913 the Doctor's diploma from the College and the degree of Doctor of Philosophy from the University. He is the author of an important work entitled "Spelling Ability, Its Measurement and Distribution."

NEW CLUB IN ILLINOIS

The latest addition to the list of Teachers College clubs is that recently organized in Illinois. Preliminary plans for the club were made at a Teachers College luncheon held at Rockford, Illinois, early in November at the time of the state teachers' meeting. Since then the club has formally organized with Miss Clara E. Babcock, M.A., 1915, head of the Training School for Teachers of Rockford, Illinois, as president, and Miss Rose A. Baird, head of the department of textiles and clothing of Rockford College, as secretary-treasurer. At a recent meeting of the Executive Committee of the Alumni Association a charter was granted the Illinois Club. The club now numbers about forty members, with news from Miss Babcock that each day the membership continues to increase. On the basis of this membership the club is entitled to two representatives in the Alumni Council of the Alumni Association. At the meeting of the Council to be held at the College February 19, in connection with the annual alumni conferences, these two representatives have arranged for two proxies, Professor Briggs and Miss Bentley. The club plans for a big meeting at the Congress Hotel in Chicago on February 19. The occasion will be a dinner at which Professor Hillegas plans to be present as College representative.

MINNESOTA CLUB HOLDS ANNUAL DINNER

The third annual dinner of the Minnesota Teachers College Club was held at the Minneapolis Athletic Club, Friday evening, October 29, with Dr. G. Stanley Hall, president of Clark

University, as the guest of honor. Dinner was served to ninety-three.

The following officers were elected for the coming year: president, Dr. F. H. Swift; vice-president, Miss Klara Michaelson; secretary-treasurer, Miss Bertha Avery. Miss Mary Coveney gave a brief report of the work of the Minnesota Club of Columbia University during the summer session.

Miss Myrtle Reed, who held the Minnesota Club Scholarship at Teachers College last summer, reported upon her summer work at Teachers College and expressed her appreciation of the scholarship. It was voted that the scholarship be continued.

Miss K. E. Braithwaite and Miss Marie Lovesness were nominated and elected to represent the Minnesota Teachers College Club at the annual alumni conference at Teachers College in February.

At the conclusion of the business of the evening "Stand Columbia" was sung with much feeling.

Dr. F. H. Swift, acting as toastmaster, called for toasts from President Hall, Miss Julia Wade Abbot, Mr. H. L. Smith and Mr. B. B. Jackson. A happy evening was brought to a close by the singing of "It's a long, long way to Teachers College" and "Good-night, Ladies."

MARYLAND CLUB RECEIVES FIRST CHARTER

The Maryland Teachers College Club was the first to receive a charter under the provisions of the new constitution of the Alumni Association as officially revised last spring. The club has been in existence for several years and has always maintained a keen professional interest in the College and its work. It numbers about forty active members, with headquarters in Baltimore. Dr. David E. Weglein, principal of the Western High School of Baltimore, is the president. At the regular fall meeting of the club, held December 3 in Baltimore, Professor Clifford B. Upton, secretary of the College, gave College news and spoke on recent developments in the professional offerings of the Schools of Education and Practical Arts. The next regular meeting of the club is held in the Spring.

VIRGINIA ALUMNI ORGANIZE

About forty Teachers College alumni in Virginia have organized themselves into a Virginia Teachers College Club. The organization took place early in November. The club had a dinner in Richmond the latter part of November in connection with the state convention of teachers held there at that time.

UNIVERSITY POSTS FOR ALUMNI

Dr. Ernest Horn, principal of the Speyer School of Teachers College and instructor in elementary education in the summer session, resigned at the end of the summer to accept a position at the University of Iowa as assistant professor of education and director of the experimental school. Dr. Horn graduated from the University of Missouri with the A.B. degree in 1907, taking his A.M. from the same institution in 1908. He took the degree of Ph.D. in Teachers College in 1914.

Mr. Dallas D. Johnson, head of the training school of the State Normal School at Bowling Green, Ohio, resigned in the fall to accept a position as assistant professor of education in the University of Washington at Seattle. Mr. Johnson took his Bachelor's degree at the Iowa State Teachers College in 1914, and his Master's degree from Teachers College in 1915. Previous to going to Teachers College Mr. Johnson was principal of one of the public schools of Seattle, Washington.

Mr. J. C. Brown, head of the department of mathematics of the Horace Mann School, resigned in August to accept a position in the University of Illinois as principal of the new University High School. He is also a member of the department of education. Mr. Brown received the degree of B.S. from Hanover College in 1901 and the degree of A.M. from Teachers College in 1912.

FINE AND INDUSTRIAL ARTS SCHOLARSHIP

The sum of five hundred dollars as a first contribution to the scholarship recently established by the alumni in fine arts and industrial arts, is the result of the entertainment and

Christmas sale given in the Thompson Gymnasium on December 3 by the alumni of these departments. The alumni are planning for similar sales each year preceding the holidays in order to make annual contributions to the fund. At the sale in December one of the attractions of great interest was the offering of Teachers College Christmas cards, of which over twelve hundred were sold. It is expected that these cards with their marked individuality and artistic merit will become a staple article in the Christmas market. All the articles offered in this sale were made by students and alumni in class exercises and in special gatherings on Saturdays and in the evenings. Another feature of the entertainment was the production of the medieval miracle play "Noah's Flood."

RECENT APPOINTMENTS

Mr. Charles B. Dyke was in October elected superintendent of schools in Millburn, New Jersey. In the same month Mr. Ira M. Gast was elected superintendent of schools at Dubois, Pennsylvania. A student of some years ago, Mr. Ira Kraybill, was elected superintendent of schools at Asbury Park to succeed Mr. Zenos Scott, who has accepted the office of assistant commissioner of education in New Jersey.

Dr. Walter Webb Kemp has been elected professor of educational administration at the University of California. Mr. Freeman Daughters, who studied at the College last year, succeeds Dr. Kemp as professor of education at the University of Montana, Missoula, Montana.

Mr. Leonard Righter, who was for two years principal of the vocational school at Asbury Park, New Jersey, has been elected assistant superintendent of the House of Refuge on Randall's Island, under the New York City school system. This post involves the directorship of all educational work.

Mr. Manly Harper, who has been studying at the College this semester, goes February 1 to direct the educational work in an experimental school just outside of Greenwich, Connecticut. This little school is undertaking to operate somewhat on the principles of Mrs. Johnson's Organic School in Fairhope, Alabama.

Mr. Alvin J. Miller, who studied at the College last year, is now doing extension work in education and psychology for the State Normal School at Kent, Ohio.

Mr. J. Howard Stoutemyer, a former graduate student, is teaching education at the State Normal, Kearney, Nebraska.

Mr. Forrest Lunt, who has for several years taught English in the Horace Mann High School for Boys, accepted on January 1 the position of keeper of the Westchester County Almshouse. This work affords opportunity for constructive planning along the latest ideas in industrial education. His place at the Horace Mann School will be filled by Mr. John Edward Hughes.

Dr. George E. Myers is devoting a part of his time to an interesting piece of research work at Sing Sing Prison, looking towards the correlation of industrial and educational work.

One of our former students, Miss Laura MacKenzie, who has been first grade critic at the State Normal School, Bowling Green, Kentucky, accepts the place of primary supervisor, to begin work at mid-year, in the State Normal and Industrial College, Milledgeville, Georgia.

Miss A. Maud Sproat, studying at the College this semester, will leave February 1 to teach in the observation school of the Youngstown, Ohio, Training School. She will handle second-grade subjects.

Mr. Frank J. Osterman sailed in December for Amanzintoti, Natal, South Africa. He will teach grade subjects in the Adams Missionary Institute of that place.

ANNUAL ELECTION OF OFFICERS

The annual election of officers of the Alumni Association will take place Saturday, February 19, in connection with the alumni reunion and conferences held at the College at that time. The officers to be elected this year, for a period of two years, are: first vice-president, second vice-president, and recording secretary. The other officers were elected last year for a two-year period. There is also to be appointed this year, as announced in the November RECORD, an alumni trustee to succeed Dr. David Snedden, whose term expires in Feb-

ruary. Nominations for the above offices and for alumni trustee were made by the alumni on blank forms sent out with the November RECORD. The returns were canvassed January 1, with the following result:

First vice-president: Miss Valentine L. Chandor, Miss Luella A. Palmer. Second vice-president: Mr. Ross O. Runnels, Miss Florence E. Winchell. Recording secretary Miss Clara A. Scott, Miss Roxana A. Steele. Alumni trustee: Mr. William T. Bawden, Mr. Bailey B. Burritt, Mr. Lotus D. Coffman, Mr. Rudolph R. Reeder.

This list of names and a blank ballot have already been mailed to each member of the Alumni Association in order that votes may be cast. The ballots are due by February 10, when they will be canvassed by the Executive Committee, who will lay the results before the Alumni Council at its meeting on February 19.

This year arrangements have been made for a secret ballot. A small ballot envelope has been provided, to which is attached a slip of paper upon which the voter inscribes his name. This ballot envelope is to be returned to the corresponding secretary in a larger envelope also provided. Before the ballots are counted all of the attached slips of paper are torn off, so that at the time of the counting there is no means of knowing from whom any particular ballot has been received. The slip of paper serves the purpose of enabling the secretary to check the voter's name against the membership list of the Alumni Association, thus determining his eligibility to vote. As soon as this eligibility is determined the slip is torn off.

ANNUAL ALUMNI CONFERENCES

The annual reunion and conferences of the Alumni Association of Teachers College will be held at the College on Friday afternoon and evening, February 18, and on Saturday, February 19. The program as planned for this meeting is more elaborate than that offered last year. One of the new features will be a general meeting on Friday afternoon at which two members of the faculty will present a summary of recent educational progress. It is planned to make this Friday afternoon

meeting a feature of future alumni conferences. This meeting will be followed by a reception by Dean and Mrs. Russell. A detailed program of the entire meeting is as follows:

FIRST GENERAL MEETING

FRIDAY, FEBRUARY 18, 3-4 P.M.

Milbank Chapel

Chairman: DR. EDWIN C. BROOME, President of the Alumni Association, and Superintendent of Schools, East Orange, N. J.

Addresses:

The Place of Field and Experimental Work in the Professional School of Education—DR. GEORGE D. STRAYER, Professor of Educational Administration, Teachers College.

Progress in the Practical Arts—DR. BENJAMIN R. ANDREWS, Assistant Professor of Household Arts, Teachers College.

RECEPTION

After the above meeting there will be a reception to the Alumni and their friends by DEAN and MRS. RUSSELL in the Thompson Gymnasium from 4-5.30 p.m.

ORGAN RECITAL

There will be an organ recital by MR. WILLIAM J. KRAFT, Associate in Music, in St. Paul's Chapel, Columbia University, on Friday from 7.30-8.15 p.m.

SECOND GENERAL MEETING

FRIDAY, FEBRUARY 18, 8.30 P.M.

Milbank Chapel

Address:

Education and the Intellectual Life in the Light of Present History—DR. JAMES HARVEY ROBINSON, Professor of History, Columbia University.

THIRD GENERAL MEETING

SATURDAY, FEBRUARY 19, 3.30-5 P.M.

Horace Mann Auditorium

Chairman: DR. EDWIN C. BROOME, President of the Alumni Association.

Addresses:

Report and Announcements—PRESIDENT BROOME.

Practical Work in Teachers College—MISS LIDA LEE TALL, Alumni Trustee and Supervisor of Grammar Grades, Baltimore County, Md.

The Contribution of Teachers College to Educational Tendencies of To-day—DR. FRANK P. GRAVES, Dean of the School of Education, University of Pennsylvania.

Address and Announcements—DEAN JAMES E. RUSSELL.

SHAKESPEARE EXHIBIT

FRIDAY AND SATURDAY, FEBRUARY 18-19

For the entire period of the Alumni Reunion a Shakesperian Exhibit of exceptional educational interest has been arranged in which various departments of the College will exhibit material characteristic of Shakespeare and his age. For further data see p. 94.

SHAKESPEARIAN FESTIVAL

SATURDAY, FEBRUARY 19, 7.30 P.M.

Thompson Gymnasium

There will be a special Alumni performance of the annual Teachers College festival which has become so popular with Alumni and students. Shakespeare and his times will be the subject of the festival, which will embody many of the forms of merry-making common to the period. A series of episodes is being tentatively worked out by different departments of the College; a fairy pantomime precedes the dawn of a day in Stratford; village folk gather with chatter and by-play, while sweets and cakes are sold; town dignitaries stroll in; sword and morrice dancers, singers, and other performers appear and show their skill; finally some members of Shakespeare's company arrive, who act for the informal audience a comedy scene from one of the master's plays; after which all Stratford will join in a country dance.

The audience are requested to wear Elizabethan costume; and to facilitate this, the committee will provide capes, at cost. The performance is for the benefit of the professorship in the Canton Christian College supported by Teachers College students.

PROGRAM OF SECTION MEETINGS

ADMINISTRATION AND COLLEGE TEACHERS OF EDUCATION

FRIDAY EVENING, FEBRUARY 18

There will be a dinner at 6.30 p.m. for men engaged in educational administration and college teaching at the West End Restaurant, 226 West 125th Street. Price, $1.25 per plate. Those expecting to attend the dinner should send their names to PROFESSOR STRAYER, Teachers College, not later than Tuesday, February 15.

The dinner will be followed by a discussion of the subject, Financing Education.

Chairman: DR. E. N. HENDERSON, Professor of Education, Adelphi College, Brooklyn.

Speakers:

DEAN RUSSELL.

DR. E. P. CUBBERLEY, Professor of Education, Leland Stanford, Jr., University.

MR. IRA T. CHAPMAN, Superintendent of Schools, Norwalk, Conn.

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: MR. WILLIAM E. STARK, Superintendent of Schools, Hackensack, N. J.

General Subject: Reorganization of Public Education.

Speakers:

As to length of school day and of school year—MR. HOWARD W. NUDD, Director, Public Education Association, New York City, and DR. FRED S. SHEPHERD, Superintendent of Schools, Passaic, N. J.

As to the use of the school plant—MR. JOSEPH M. GWINN, Superintendent of Schools, New Orleans, and MR. ANGELO PATRI, Principal, Public School No. 45, New York City.

As to the division of the whole curriculum among schools or departments—DR. THOMAS H. BRIGGS, Associate Professor of Education, Teachers College, and MR. CHARLES S. MEEK, Superintendent of Schools, San Antonio, Texas.

Election of Committee on Arrangements for the meeting of the section in 1917.

SECONDARY EDUCATION

SATURDAY, FEBRUARY 19, 9.30 A.M.

General Topic: The Junior High School.

Speakers:

The Organization, Claims, and Purposes of the Junior High School—MR. D. C. BLISS, Superintendent of Schools, Montclair, N. J.

Obstacles to be Encountered in the Establishment of the Junior High School—MR. IRA CHAPMAN, Superintendent of Schools, South Norwalk, Conn.

Opportunities that the Junior High School Offers to the Student of English—MR. BENJAMIN HEYDRICK, High School of Commerce, New York City.

Latin in the Junior High School—MISS CLARA A. SCOTT, Nutley, N. J.

An Outline of Community Civics for Junior High School Students—MR. W. C. WHITE, Principal of the High School, Englewood, N. J.

LUNCHEON

The committee in charge of the Secondary Education Conference is planning to have a luncheon in the Bancroft Dining Room (121st Street, directly across from the College), on February 19, at 12.30. The professors in the various fields of secondary education have promised to be present to welcome their alumni. The price of the luncheon will be 65 cents. Please send your name and your money to MISS CLARA E. FRANKE, Teachers College, at an early date. If you wish to be seated at the table of a particular professor, please make a statement to that effect. As the seating capacity of the dining room is limited it will be well to make an early reservation (before February 15).

ROUND TABLE CONFERENCES OF SECONDARY DEPARTMENTS

SATURDAY, FEBRUARY 19, 2 P.M.

ENGLISH

PROFESSOR BAKER will hold a Round Table in English. PROFESSOR ALLAN ABBOTT will discuss the Shakespeare Exhibit.

LATIN

PROFESSOR LODGE will not hold a Round Table but will be at home to students to talk with them and show them the new books.

MATHEMATICS

The Round Table in Mathematics will be devoted to a discussion of the subject of Mathematics in the Junior High School. The leader of the Round Table will be MR. J. H. MINNICK, now a graduate student in the University of Pennsylvania. Among those to take part will be MR. H. F. HART of Montclair, MISS MATILDA AUERBACH of the Ethical Culture School, MR. J. R. MACGOWAN of the Horace Mann School, and MISS MARY E. CASTER and MISS MABEL RHODES of Teachers College.

HISTORY

PROFESSOR JOHNSON will be at home in his office to talk with students and show them new books.

GERMAN

PROFESSOR BAGSTER-COLLINS will be at home to his former students in Room 230.

PHYSICAL SCIENCE

Chairman: MR. W. G. WHITMAN, State Normal School, Salem, Mass.

Subject: Discussion of Teaching by Projects.

Speakers:

DR. WILLIAM HEARD KILPATRICK, Professor of Philosophy of Education, Teachers College.

MISS MARTHA C. JENKINS, New York City.

MR. BENJAMIN M. ALDRICH, High School, Nyack, N. Y.

MISS MILDRED WOODHULL, Ethical Culture School, New York City.

MR. J. C. MOORE, High School, Bridgeport, Conn.

ELEMENTARY EDUCATION

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: DR. LIDA B. EARHART, Principal in Public School, New York City.

General Subject: Uses and Limitations of Initiative in Children in Education.

Speakers:

Class Responsibility During the Recitation—MR. ELMER A. HOTCHKISS, Associate Superintendent of Schools, Cleveland. Discussion led by MR. CHARLES S. MEEK, Superintendent of Schools, San Antonio, Texas.

The Use of Textbooks and References—MISS ALICE R. PAINE and MRS. HARRIET STRONG WILSON, Ethical Culture School, New York City.

The Relation of Initiative to Results—Miss Mary H. Lewis, Park School, Buffalo. Discussion led by Dr. William H. Kilpatrick, Associate Professor of Education, Teachers College.

Summary of Discussion by Mr. Henry C. Pearson, Principal of the Horace Mann School, New York City.

LUNCHEON

The Elementary Department luncheon will be held in the Thompson Building, Saturday, February 19, at 12.30 p.m. Anyone desiring to reserve a place should send name and $.80 not later than February 15 to Miss Grace A. Day, Teachers College.

Speakers:

Dean Russell.

Miss Jessie Lowson, Teachers College.

KINDERGARTEN EDUCATION

FRIDAY, FEBRUARY 18, 8.15 P.M.

Milbank Chapel

Address:

Education and the Intellectual Life in the Light of Present History—Dr. James Harvey Robinson, Professor of History, Columbia University.

SATURDAY, FEBRUARY 19, 9.30 A.M.

Speakers:

Self-Organized Group Work in the Kindergarten and Elementary School—Dr. Colin A. Scott, Professor of Education, Mount Holyoke College.

Report on Evolution of Law and Social Organization in the Experimental Playground—Miss Mary E. Rankin, Teachers College.

LUNCHEON

There will be a luncheon for the Kindergarten section on Saturday at 12 o'clock in the Kindergarten Room. Place reservations should be sent to Miss Grace L. Brown, Teachers College, before February 14. Tickets, $1.00 each.

FINE AND INDUSTRIAL ARTS

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: Miss Lucia Dement, Horace Mann School.

Speakers:

New Adaptations of Teachers College to Industrial Arts Needs—Dr. F. G. Bonser, Associate Professor of Education, Teachers College.

The Progress in Fine Arts—Mr. Arthur W. Dow, Professor of Fine Arts, Teachers College.

The Educational Possibilities at Sing Sing—Mr. George E. Meyer.

Color Printing in Schools with a Limited Equipment. (Method and Demonstration.)—Mr. Vojtech Preissig.

Modern Posters and Advertising—Miss Sallie B. Tannahill, Instructor in Fine Arts, Teachers College.

Modern Methods in Painting—Mr. Charles A. Martin, Instructor in Fine Arts, Teachers College.

Report of Fine and Industrial Arts Alumni Scholarship Committee—Miss Lucia Dement, Horace Mann School.

Possibilities in the Use of Tin Cans for Metal-work—Mr. Edward Thatcher, Instructor in Metal-work, Teachers College.

Report on the Social Motive School—Miss Bertha Bentley.

How Industrial Arts May be Correlated with the Other Subjects of the Curriculum—Miss Florence A. Church, Dr. Leete School.

Elementary Industrial Arts in the Public School—Miss Helen Gover, Passaic, N. J.

LUNCHEON

The morning program will be followed by a luncheon at 12.30. Those wishing to reserve places notify Miss Grace E. Riblet, Hunter College, New York City, before February 11, 1916. Cost, $.50 per person.

HOUSEHOLD ARTS

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: Miss Emma H. Gunther, Assistant Professor of Household Administration, Teachers College.

Speakers:

Practice Apartments for Training in Household Management—Miss Mabel Hyde Kittredge, President of Association of Housekeeping Centers, New York City.

Phases of Domestic Art Teaching in Department Stores—Miss Beulah Kennard, Education Director, Department Store Association, New York City.

Opportunities in Rural Education To-day—Miss Martha Van Rensselaer, Cornell University, President of American Home Economics Association.

Brief Discussion—Miss Carrie Lyford, Specialist in Home Economics, Washington, D. C.

LUNCHEON

SATURDAY, FEBRUARY 19, 12.30

Horace Mann Lunchroom

For all household arts teachers and those in household and institution administrative work. Cost of luncheon, 50 cents. Please write Professor Emma H. Gunther, Teachers College, before February 16 to reserve places.

Toastmaster: Dr. Benjamin R. Andrews, Assistant Professor of Household Arts, Teachers College.

NURSING AND HEALTH

FRIDAY, FEBRUARY 18, 7.30 P.M.

From 7.30 to 8.30 p.m. there will be informal Round Tables for the following groups: Public Health Nurses, Instructors, Superintendents of Nurses. These will be followed at 8.30 p.m. by the program below.

Chairman: MISS ANNA EWING, Supervisor, Henry Street Settlement, New York City.

Speakers:

The School Nurse as a Factor in Public Health Work—DR. HOWE, Medical Inspector of Schools for the State of New York.

The Duties of the School Nurse—MISS HELEN YOUNG, School Nurse, Highland Park, Chicago.

The Organization of the Work in Small Communities—MISS ELIZABETH STRINGER, Supervisor of Nurses, Metropolitan Life Insurance Co., New York.

Teaching Opportunities of the School Nurse—MISS ANNA STANLEY, School Nurse, Cleveland, Ohio.

Present Demand for School Nurses and their Preparation—MISS ADELAIDE NUTTING, Professor of Nursing and Health, Teachers College.

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: MISS S. LILLIAN CLAYTON, Superintendent of Nurses, Philadelphia General Hospital.

Transaction of Business.

Speakers:

Address of Welcome—MISS ADELAIDE NUTTING, Professor of Nursing and Health, Teachers College.

Standardization in the Field of Education—DR. GEORGE DRAYTON STRAYER, Professor of Educational Administration, Teachers College.

Principles of Standardization and Applications in Fields Related to Nursing—MISS ALICE LAKE, Superintendent, Nashua Hospital, Nashua, N. H.

The Need of Standardization in Hospital Work and What Has Already Been Done—MISS LAURA LOGAN, Superintendent of Nurses, Cincinnati General Hospital, Cincinnati.

Relation to the Teaching of Nursing Procedures—MISS GRACE WATSON, Instructor, Bellevue Training School for Nurses.

Value of Standardization in Public Health Work—MISS BESSIE AMERMAN, Superintendent of Nurses, Henry Street Settlement, New York City.

What Can Our Alumnae Contribute to This Problem—General Discussion.

LUNCHEON

Luncheon for the former students of the Department will be served at 12.30 in the Biacake Tea Room, 2929 Broadway. Tickets, 60 cents each. Those expecting to attend will please notify MISS LINETTE PARKER, 509 West 121st Street, New York City, before February 15, and places will be reserved for them.

PHYSICAL EDUCATION

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: DR. J. F. WILLIAMS, Assistant Professor of Physical Education, Teachers College.

Subject: **The Importance and Place of Club Activities of Youth in the Program of Physical Education, with Special Reference to Training for Social Efficiency.**

Speakers: Dr. Thomas D. Wood, Professor of Physical Education, Teachers College, Miss Grace Parker, Secretary Inkowa Club, New York City, and Miss Carrie Van Ashcroft, Head of Department of Physical Training, Julia Richmond High School, New York City.

Demonstration: Club Activities of the Horace Mann School.
Leader: Mr. Gucker.

MUSIC

SATURDAY, FEBRUARY 19, 9.30 A.M.

Chairman: Miss Florence A. Marsh, Ethical Culture School, New York City.

Speakers:

An Investigation of Instrumental Music in Our Public Schools—Miss Gladys A. Brown.

Some Phases of High School Choral Work—Mr. Carl G. Schmidt, Erasmus Hall High School, Brooklyn.

Songs That Live—Mrs. O. S. Morgan.

Community Music—Discussion led by Miss Louise R. Curry, Teachers College, and Miss Florence A. Marsh, Ethical Culture School.

LUNCHEON

Luncheon will be served at 12.30 p.m. at the Iradell, 420 West 119th Street, at 50 cents per cover. Reservations may be made with Miss Eleanor Wright, 106 Morningside Drive, before February 15.